San Francisco Bay Crossings Study

TRAVEL EVALUATION REPORT

July 22, 2002

Prepared by
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Prepared for
Metropolitan Transportation Commission

TRAVEL EVALUATION REPORT

PURPOSE

The purpose of this Travel Evaluation Report is to document and summarize the travel related effects of the San Francisco Bay Crossings Study's six Final Alternatives. In addition to the evaluation of the six build alternatives, the report summarizes the results of six "sensitivity analyses". These sensitivity analyses include the implementation of various policy measures such as smart land use growth, congestion pricing and others.

BACKGROUND

This report represents one work product among many that have been prepared for the Bay Crossings Study. The Conceptual Alternatives Report, finalized in the late summer of 2001, described a wide range of potential options for improving transbay travel. The large number and range of improvement options outlined in the Conceptual Alternatives Report were screened at a "fatal flaw" level and packaged into six alternatives for further consideration and analysis. This process and results were described in the November 19, 2001 Draft Screening and Final Definition of Alternatives Report. As further engineering, cost, environmental and travel analysis of the alternatives was conducted, the six alternatives continued to be refined.

The six alternatives carried forward for further consideration and evaluation are as follows:

- **Alternative 1** includes the implementation of expanded express bus service, carpool lane extensions, operational improvements in the Bay Bridge, San Mateo Bridge and Dumbarton Bridge corridors. In addition, the alternative includes the purchase and use of three-door BART cars on the transbay routes.
- **Alternative 2** is the implementation/expansion of rail service in the Bay Bridge corridor. Two different services, BART and Commuter Rail, have been detailed and evaluated separately in this alternative. Both options include the construction of a new rail tunnel under the Bay connecting Oakland and San Francisco.
- **Alternative 3** includes improvements to the San Mateo Bridge, proposed in two phases. Phase I would install a reversible barrier on the high bridge, allowing for an additional lane to be provided in the peak direction of travel. Phase II would widen the causeway and construct a new high bridge to provide four lanes in either direction. This phase would also include widening of I-880 between I-238 and SR 92.
- **Alternative 4** is the construction of a New Mid-Bay Bridge connecting I-238 with I-380. The bridge would be a six lane facility. Alternative 4 also includes a bike lane and aggressive express bus service across the new bridge.
- **Alternative 5** is the rehabilitation of the Dumbarton Rail Bridge. Two levels of service are under consideration and have been evaluated. The "Basic" service plan would initiate service from Union City to San Jose and Millbrae. The "Expanded" service plan would include service from Tracy to San Jose and Millbrae in addition to the basic service.
- **Alternative 6** includes the construction of an "East Palo Alto/University Avenue Bypass". This would consist of the construction of a new roadway connecting the Dumbarton Bridge with US 101 south of the Embarcadero Road interchange. The southern connection would only be to and from US 101 south, links to Palo Alto surface streets would not be provided.

EVALUATION CRITERIA

The evaluation criteria to be used in the assessment of the six alternatives can be categorized into three groups:

1. Mobility Criteria;
2. Cost; and
3. Environmental and Socio-Economic Considerations.

A number of mobility criteria have been used to assess the travel related benefits and impacts of each of the alternatives. This analysis uses both quantitative outputs from the Metropolitan Transportation Commission's (MTC) travel demand model, along with supporting data and calculations developed by the consultant team, as well as qualitative assessments of various other factors. The main purpose of the Travel Evaluation Report is to document the mobility evaluation of the six Final Alternatives.

Two other work products, the Cost Report and Social/Environmental Report, have been prepared in parallel with this report. The May 2002 Cost Report described the Capital and Operation and Maintenance costs of each alternative, while the May 2002 Social/Environmental Report documented the likely social and environmental impacts of the alternatives at a general level, appropriate to the conceptual nature of the current work.

Travel Demand Modeling

As discussed above, the MTC travel demand forecast model was used to evaluate the effects of each of the six alternatives on transbay travel. The analysis of new ferry routes is being carried out separately by the Water Transit Authority. The study has a horizon year of 2025, and each model "run" assesses the benefits of the six alternatives in the year 2025. The results of the travel forecasts are compared to a "Baseline" scenario, in 2025 which includes projects in MTC's 2001 RTP, exclusive of the improvements included in the six alternatives. Future land use assumptions are derived from the projections prepared by the Association of Bay Area Governments (ABAG Projections 2002).

MOBILITY CRITERIA

Comparisons between alternatives and the baseline transportation system highlight the system wide effects on mobility of various transbay improvements as well as the effects in the specific bridge corridors.

Change in Trip Patterns

As a starting point for the future analysis of transbay crossing improvements, the origin and destinations of trips which will use these improvements is presented. Total trips and their distribution between east bay and west bay origins and destinations are described for 2025. Because a new bridge could have a pronounced effect on transbay trip patterns, the origins and destinations of trips are also presented separately for this alternative (Alternative 4-New Mid Bay Bridge). Table 1 presents the MTC Travel Demand Model's County-to-County Trip Table for 2025 and the percentage change from 1998 is noted.

Table 1
Person Trips Between/Within Counties in 2025
Thousands of Daily Trips and Percent Change from 1998

	Destination									
Origin	**Alameda**	**Contra Costa**	**Marin**	**Napa**	**San Francisco**	**San Mateo**	**Santa Clara**	**Solano**	**Sonoma**	**All Counties**
Alameda	4,067	203	14	4	242	144	276	13	8	4,971
	25%	58%	135%	110%	40%	49%	40%	74%	121%	28%
Contra Costa	431	2,824	15	11	195	41	47	58	9	3,630
	43%	39%	94%	83%	46%	59%	75%	48%	97%	41%
Marin	14	10	722	3	107	12	4	4	33	908
	59%	67%	17%	118%	21%	23%	47%	52%	107%	21%
Napa	6	9	3	436	6	1	1	19	35	517
	44%	54%	65%	43%	41%	45%	77%	70%	91%	47%
San Francisco	118	36	35	2	2,171	269	51	5	7	2,694
	31%	41%	26%	105%	11%	14%	46%	66%	79%	13%
San Mateo	93	21	10	1	426	2,067	308	2	2	2,930
	57%	75%	64%	69%	20%	19%	25%	74%	79%	21%
Santa Clara	176	18	3	1	54	238	6,694	2	2	7,187
	56%	74%	74%	90%	55%	38%	26%	77%	68%	27%
Solano	52	119	13	43	38	14	7	1,301	10	1,597
	67%	65%	86%	164%	24%	98%	63%	58%	90%	60%
Sonoma	10	7	53	29	26	5	3	5	1,653	1,791
	44%	40%	38%	51%	16%	26%	56%	71%	43%	43%
All Counties	4,967	3,248	868	529	3,264	2,791	7,392	1,410	1,758	26,227
	28%	42%	22%	50%	17%	22%	27%	58%	45%	30%

Indicates transbay trips

"Select Link" Analysis - Origins and Destinations by Bridge Corridor

The MTC travel model software has the ability to evaluate trip origins and destinations on specific links of the transportation network. For the purposes of this study, this has been done for each of the study bridge crossings. By querying the model in terms of the origins and destinations of trips on the bridges, the highest volume origin/destination pairs for each bridge corridor has been ascertained. This analysis serves to indicate the type of markets being served by the individual bridges, and the potential markets for improved transit service to divert bridge auto users to transit. Another benefit of this select link analysis was to identify the key origins and destinations to analyze for changes in travel time. That is, changes in transit and auto travel times can be compared both to the baseline and among alternatives for these selected high volume origin/destination pairs.

The attached Figures 1 through 10 present the select link analysis results for the three bridges (Bay Bridge, San Mateo Bridge and Dumbarton Bridge) and the New Mid-Bay Bridge proposed under Alternative 4.

Select link analysis has also been conducted for Alternative 4 because it has the greatest likelihood to have a pronounced effect on study area origins and destinations.

Figures 1 through 6 illustrate the select link analysis for the three existing study bridges for the base years 1998 and 2025. In each of the figures, MTC zones are shaded by trip making quartile. For each of the analyses, the model's zones have been ranked by their contribution to travel across the link selected. The highest trip contributing zones which comprise 25 percent of total travel across the link are then shaded the darkest color and ranked as "high" contributors on the figures. Medium, Low and Minimal contributors consist of the other three quartiles of trip making zones.

Bay Bridge Corridor

As documented in the Existing Conditions Report and illustrated in Figures 1 and 2, the Bay Bridge Corridor is primarily traveled by people moving between the Oakland/Berkeley area and San Francisco. In the East Bay the remainder of Alameda County, in combination with Contra Costa and southern Solano Counties account for the majority of the other origins and destinations. In the West Bay, Southern San Francisco, Daly City and the San Francisco Airport fill out the remainder of the origins and destinations.

San Mateo-Hayward Bridge Corridor

Figures 3 and 4 present the results of the select link analysis on the San Mateo-Hayward Bridge for the years 1998 and 2025, respectively. As presented in the figures, the San Mateo-Hayward Bridge serves a very diverse set of origins and destinations in both the East and West Bays. In the East Bay, bridge users are concentrated in San Leandro, Hayward, Fremont, southern Oakland and Castro Valley. In the West Bay, major users are to and from San Mateo, Foster City and the San Francisco International Airport.

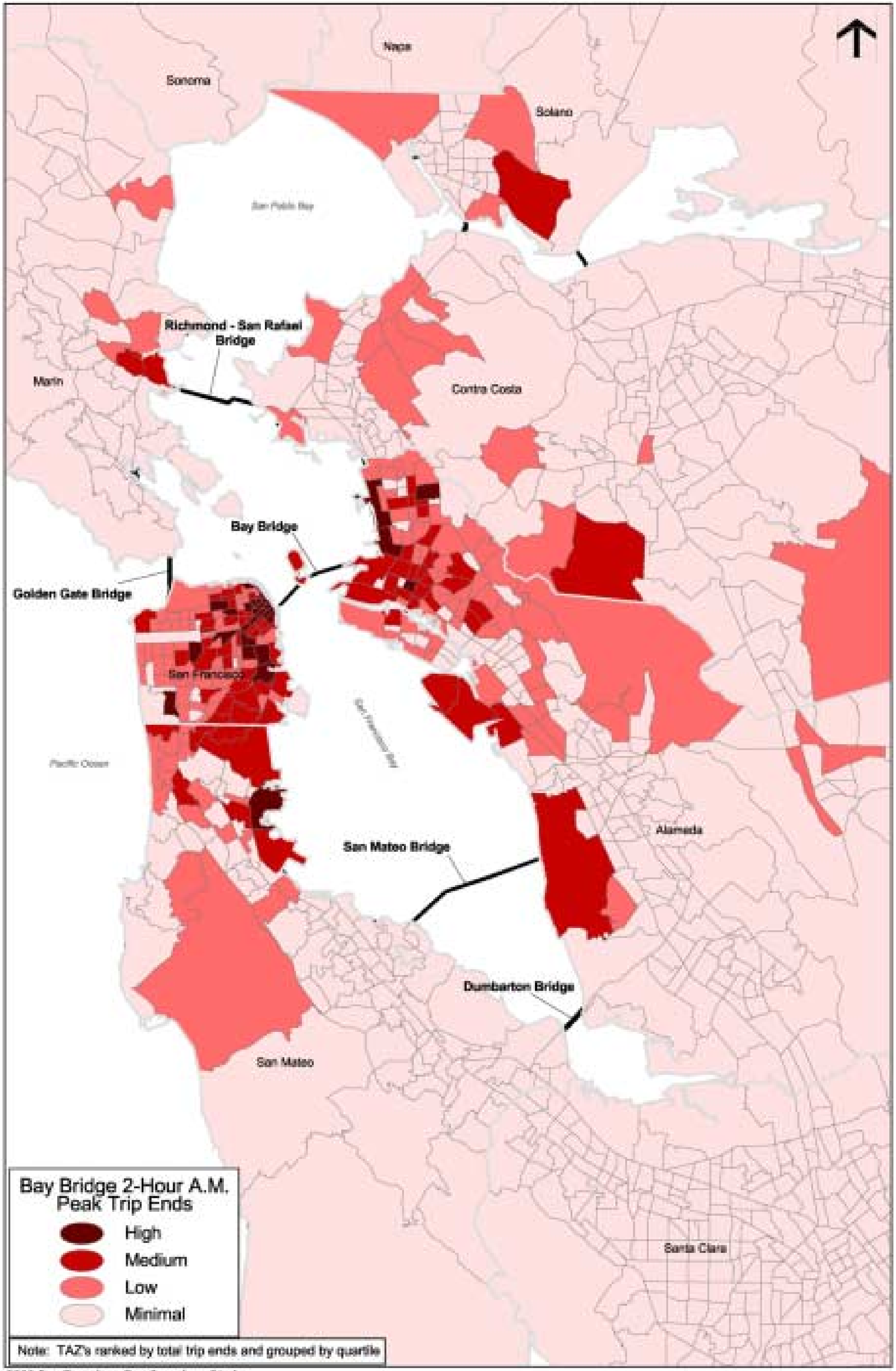
Dumbarton Bridge Corridor

Figures 5 and 6 present the results of the select link analysis on the Dumbarton Bridge for the years 1998 and 2025, respectively. As illustrated in Figures 5 and 6, this facility primarily serves the areas on either side of the span. In the East Bay, trips are primarily concentrated in Fremont, Union City and southern Hayward, while in the West Bay trips are concentrated in East Palo Alto, Palo Alto, Menlo Park and other surrounding municipalities.

New Mid-Bay Bridge Corridor

The results of the 2025 select link analysis for the New Mid-Bay Bridge (Alternative 4) are presented in Figure 7. In the East Bay, this facility would serve a wide range of origins and destinations, including San Leandro, Hayward, the Oakland International Airport and southern Alameda County. In the West Bay, the bridge's trips would be concentrated in the area surrounding the bridge's touch-down including: the San Francisco International Airport, southern San Francisco, and the areas immediately surrounding the airport.

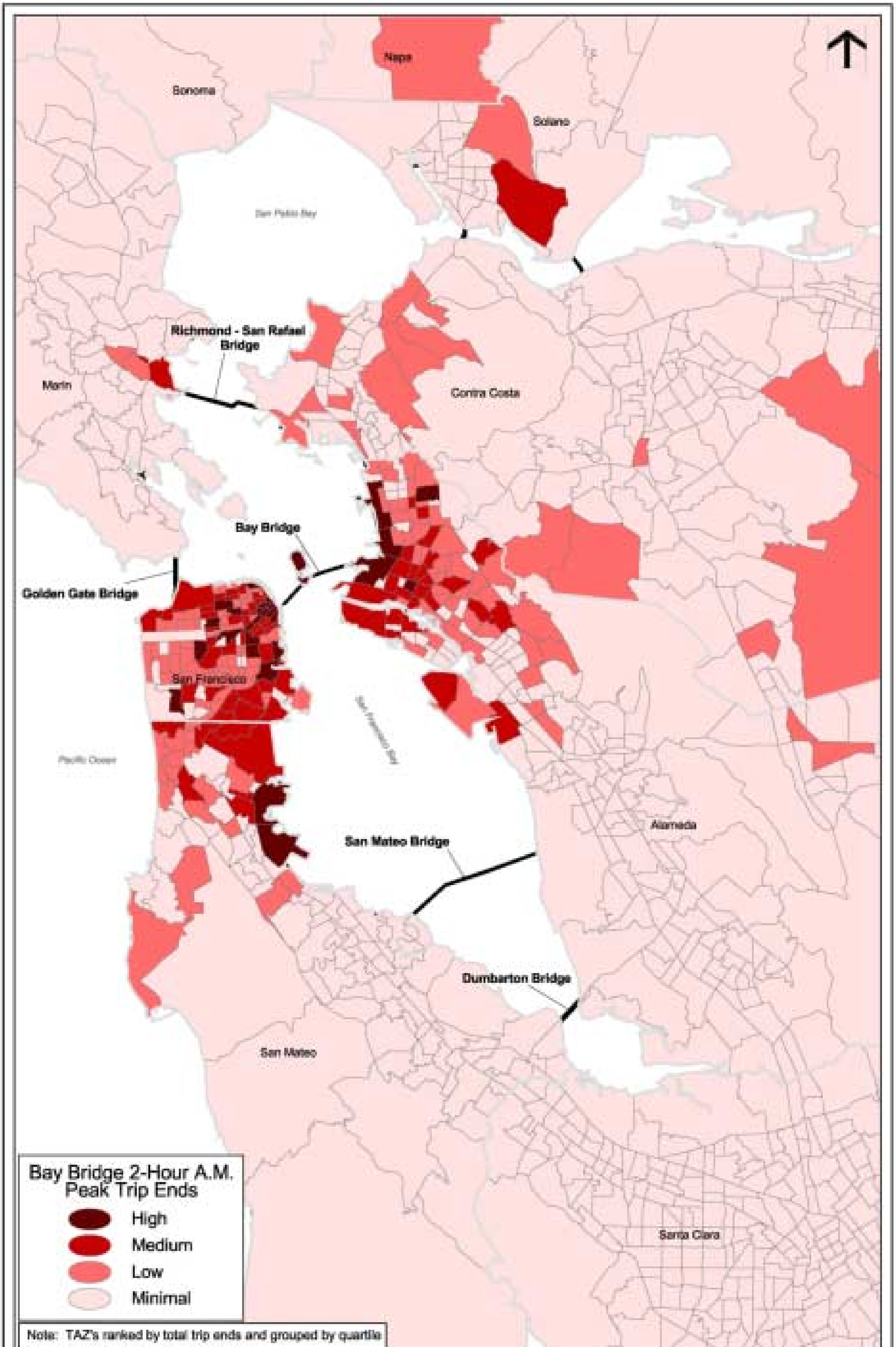
Figures 8 through 10 present the results of the select link analysis for the Bay Bridge, San Mateo Bridge and Dumbarton Bridges, respectively. The New Mid-Bay Bridge would have the most pronounced effect on the San Mateo Bridge's origins and destinations. With the new bridge in place, the San Mateo-Hayward Bridge would serve a more southern set of trip origins and destinations. Many of the trips currently originating in the northern portion of this bridge's area of influence, particularly those in the Oakland and San Francisco Airport areas, would shift to the new bridge with its construction. The New Mid-Bay Bridge would also have an impact on travel across the Bay Bridge. As illustrated in Figure 8, many of the Bay Bridge trips in the southern portion of its area of influence would shift to the new bridge.



Bay Bridge Crossings - Base Year 1998

February 2002

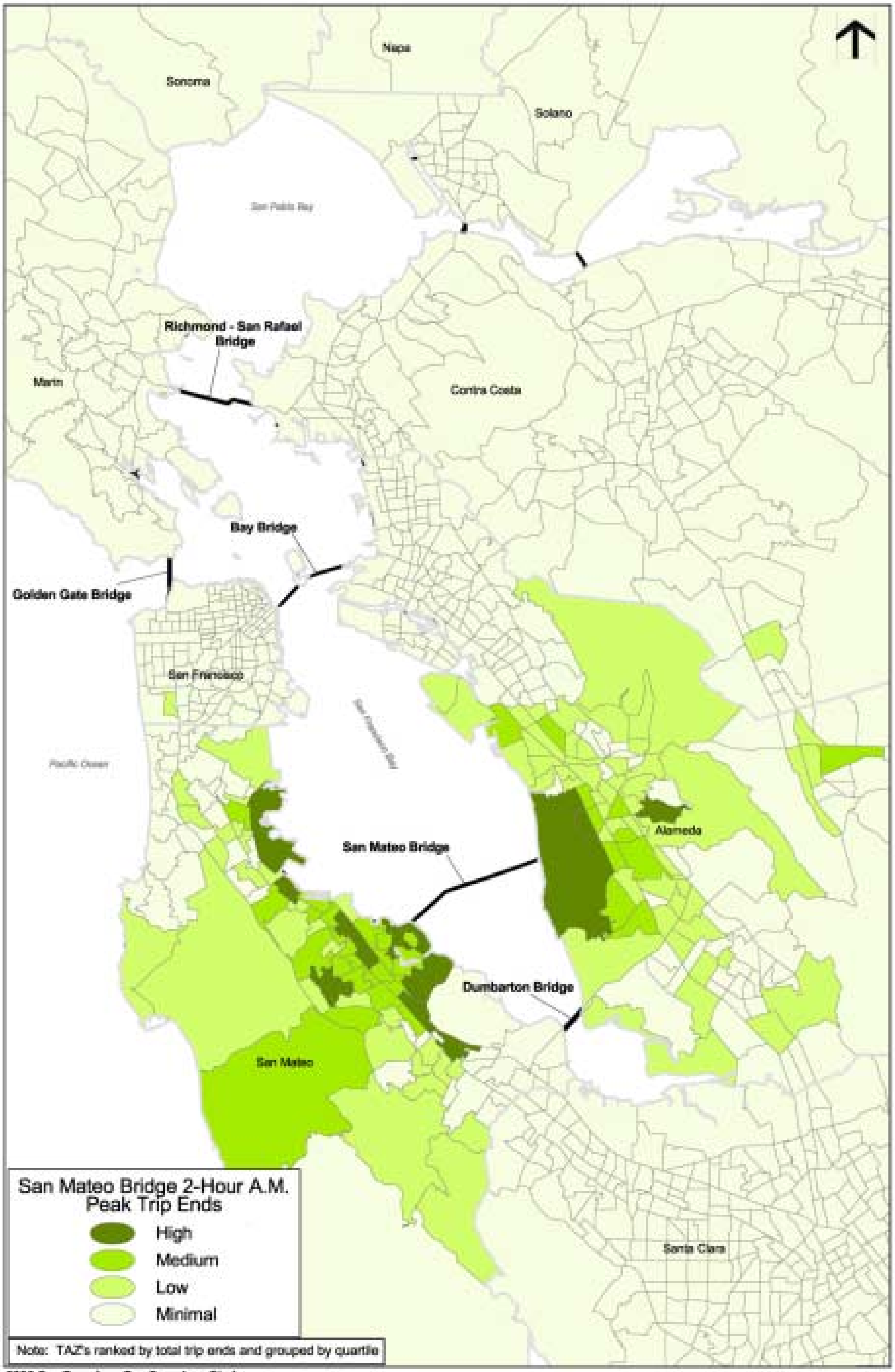
Figure 1



Bay Bridge Crossings - Base Year 2025

February 2002

Figure 2



2000 San Francisco Bay Crossings Study

San Mateo Bridge Crossings - Base Year 1998

February 2002

Figure 3

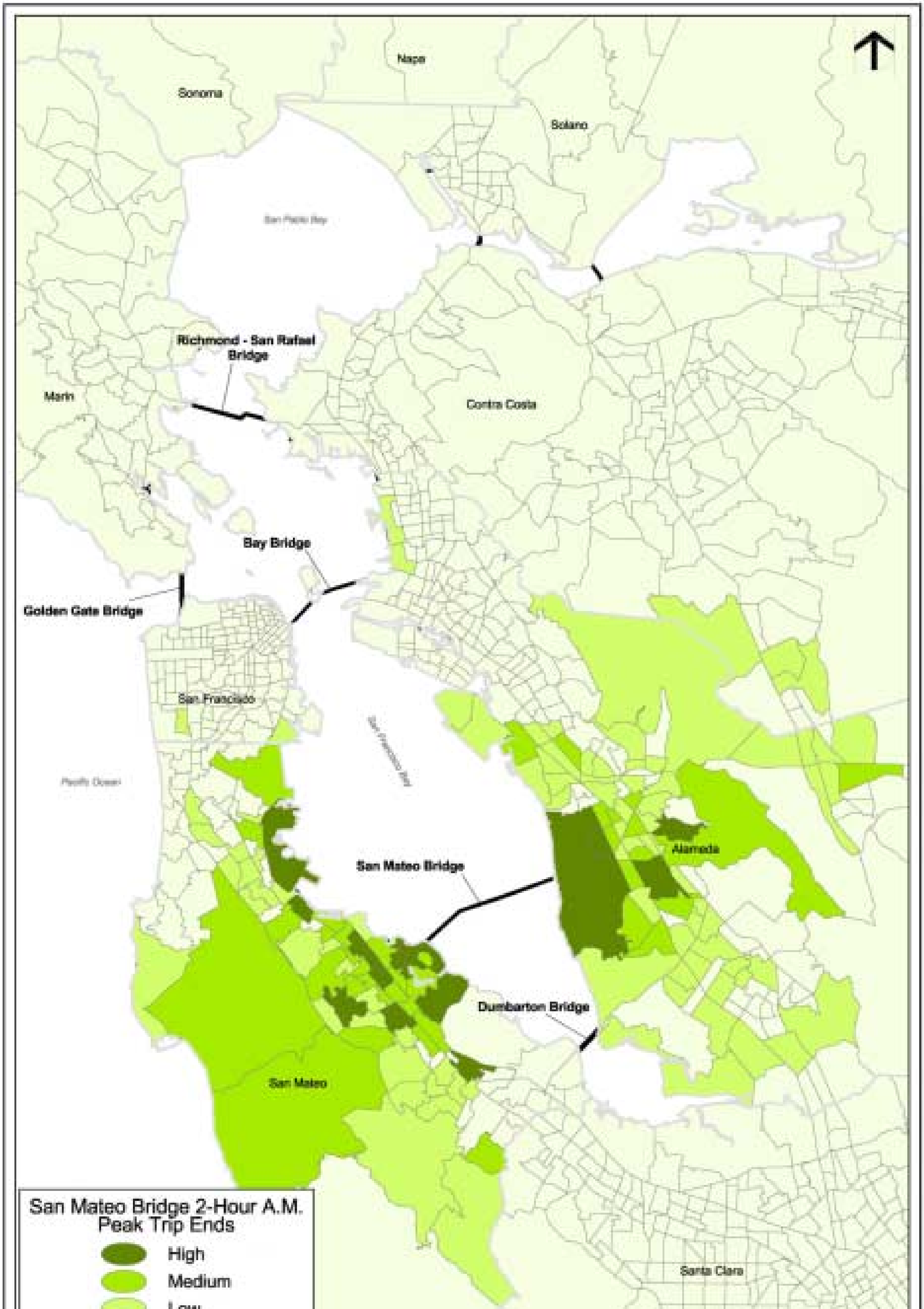
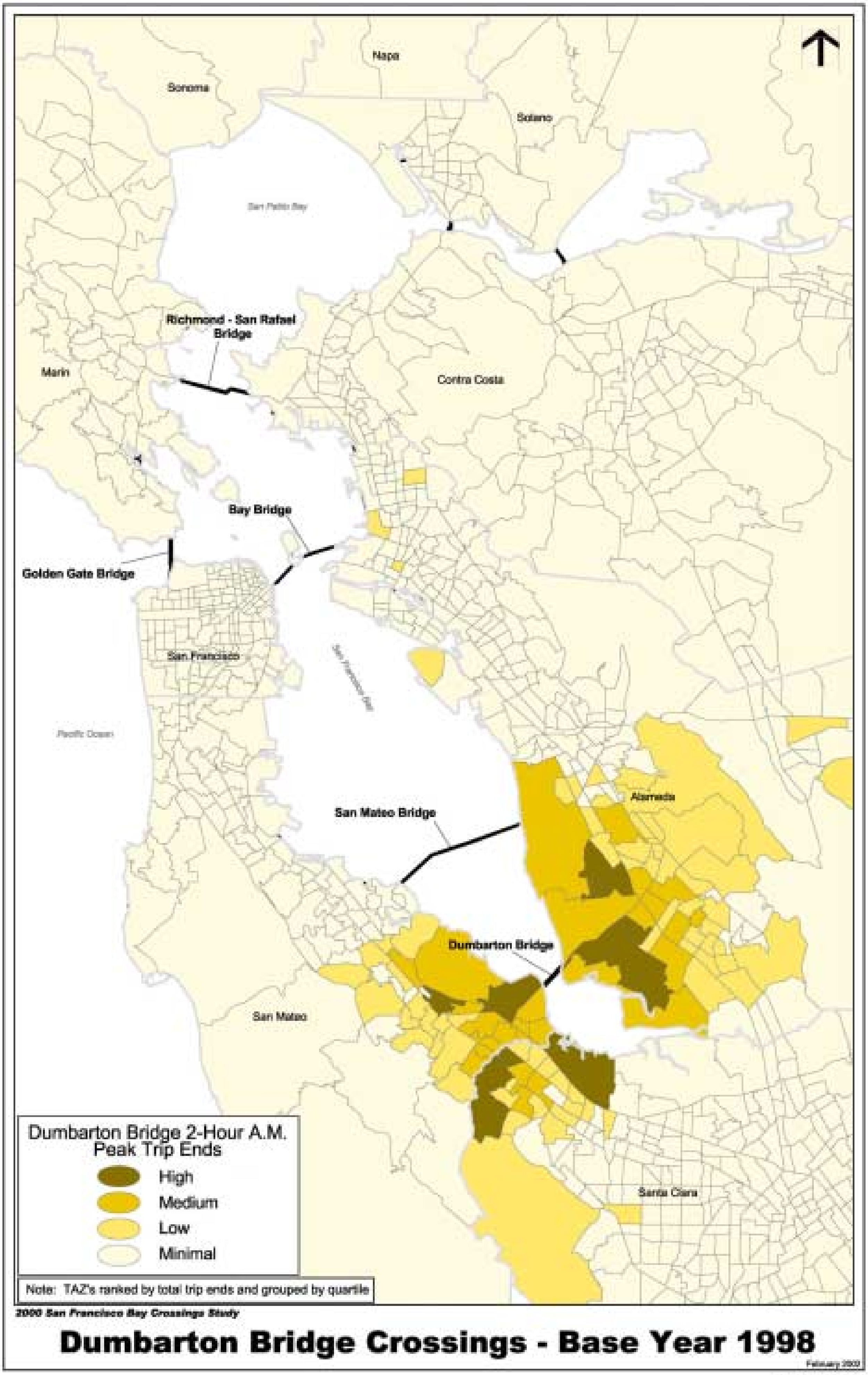

Napa
Sonoma
Solano
San Pablo Bay
Richmond - San Rafael Bridge
Marin
Contra Costa
Bay Bridge
Golden Gate Bridge
San Francisco
San Francisco Bay
Pacific Ocean
Alameda
San Mateo Bridge
Dumbarton Bridge
San Mateo
Santa Clara
San Mateo Bridge 2-Hour A.M. Peak Trip Ends
High
Medium
Low
Minimal
Note: TAZ's ranked by total trip ends and grouped by quartile
2000 San Francisco Bay Crossings Study
San Mateo Bridge Crossings - Base Year 2025
February 2002

Figure 4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Dumbarton Bridge
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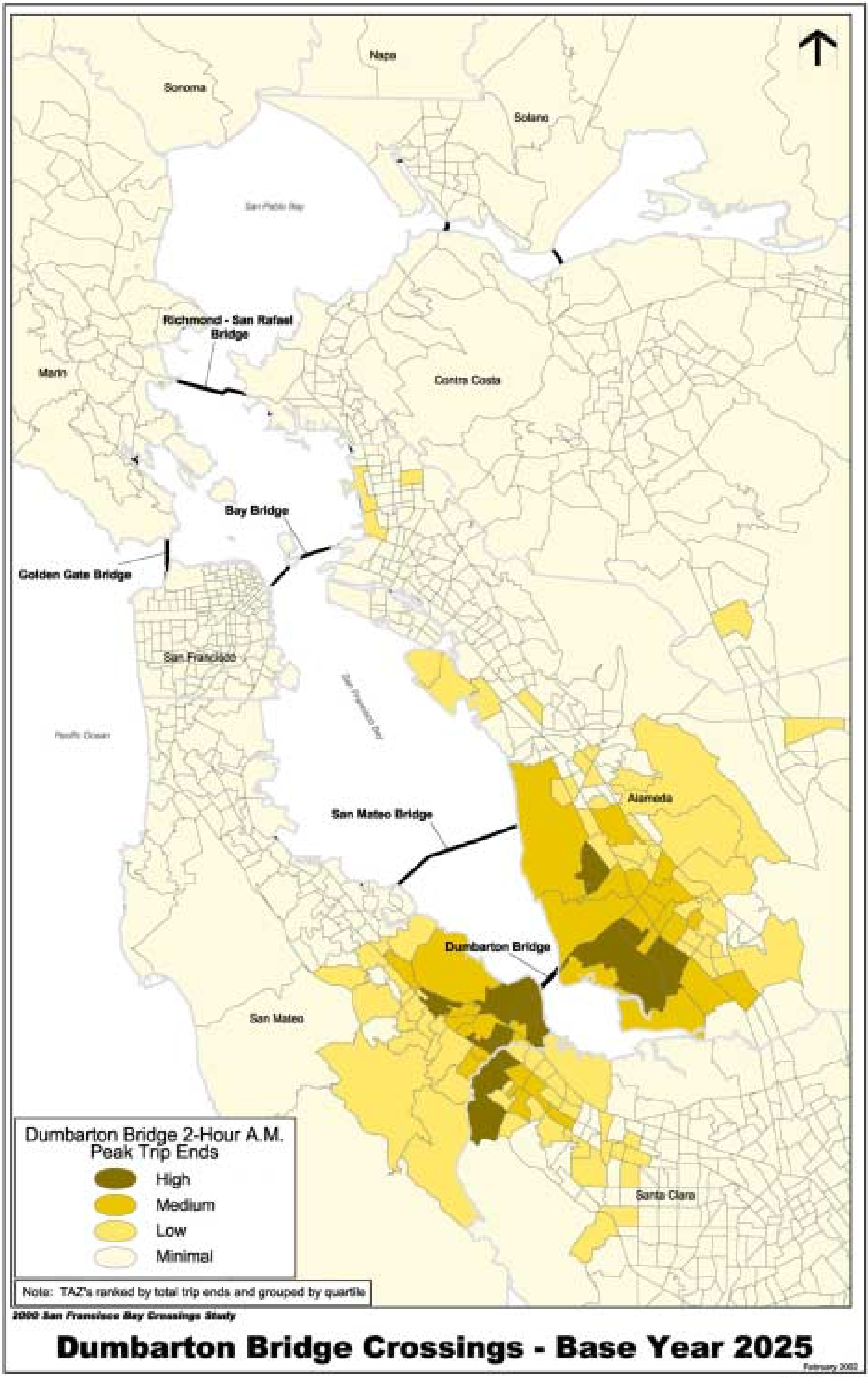
Dumbarton Bridge 2-Hour A.M. Peak Trip Ends
High
Medium
Low
Minimal
Note: TAZ's ranked by total trip ends and grouped by quartile
2000 San Francisco Bay Crossings Study
Dumbarton Bridge Crossings - Base Year 1998
February 2000

Figure 5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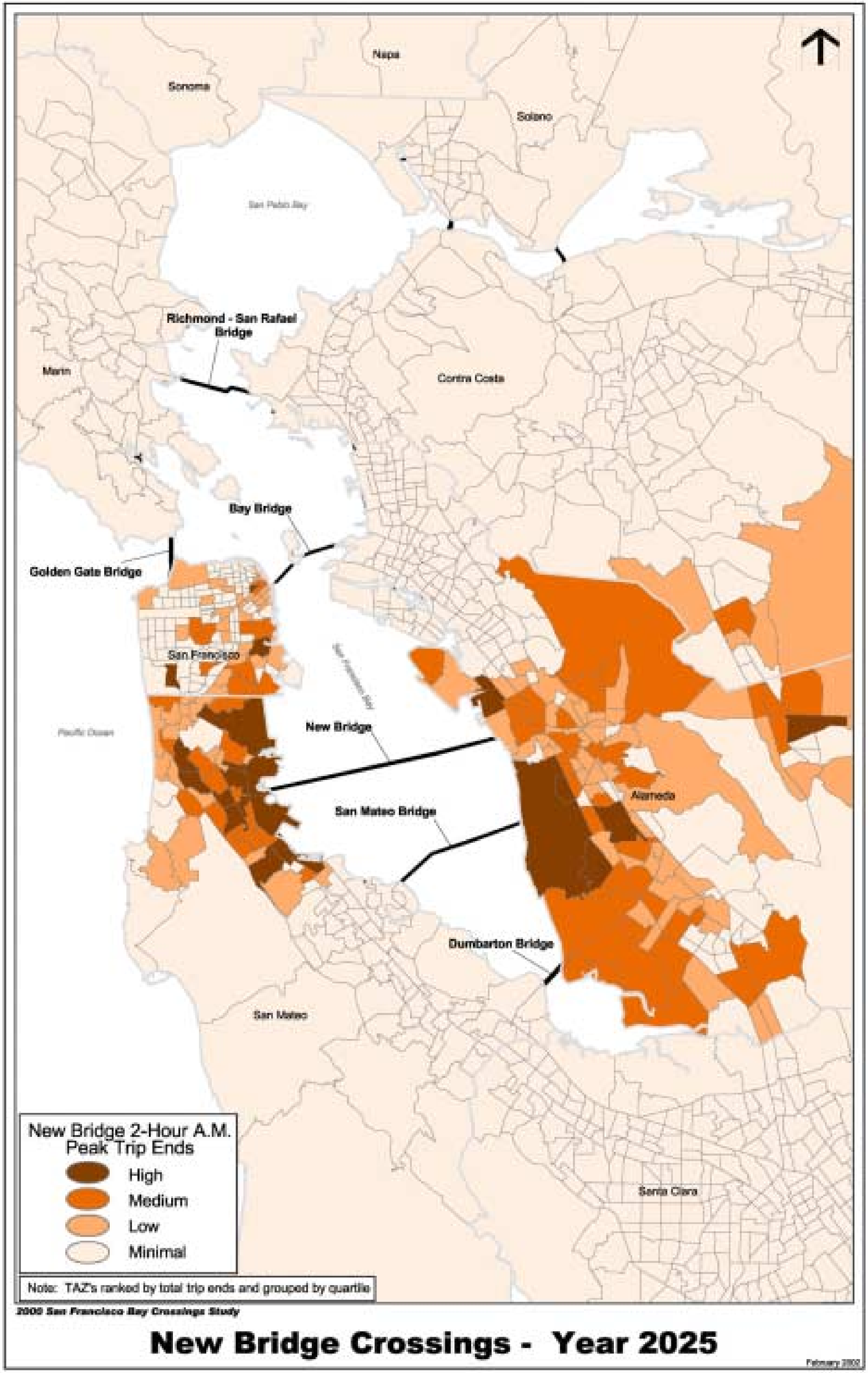
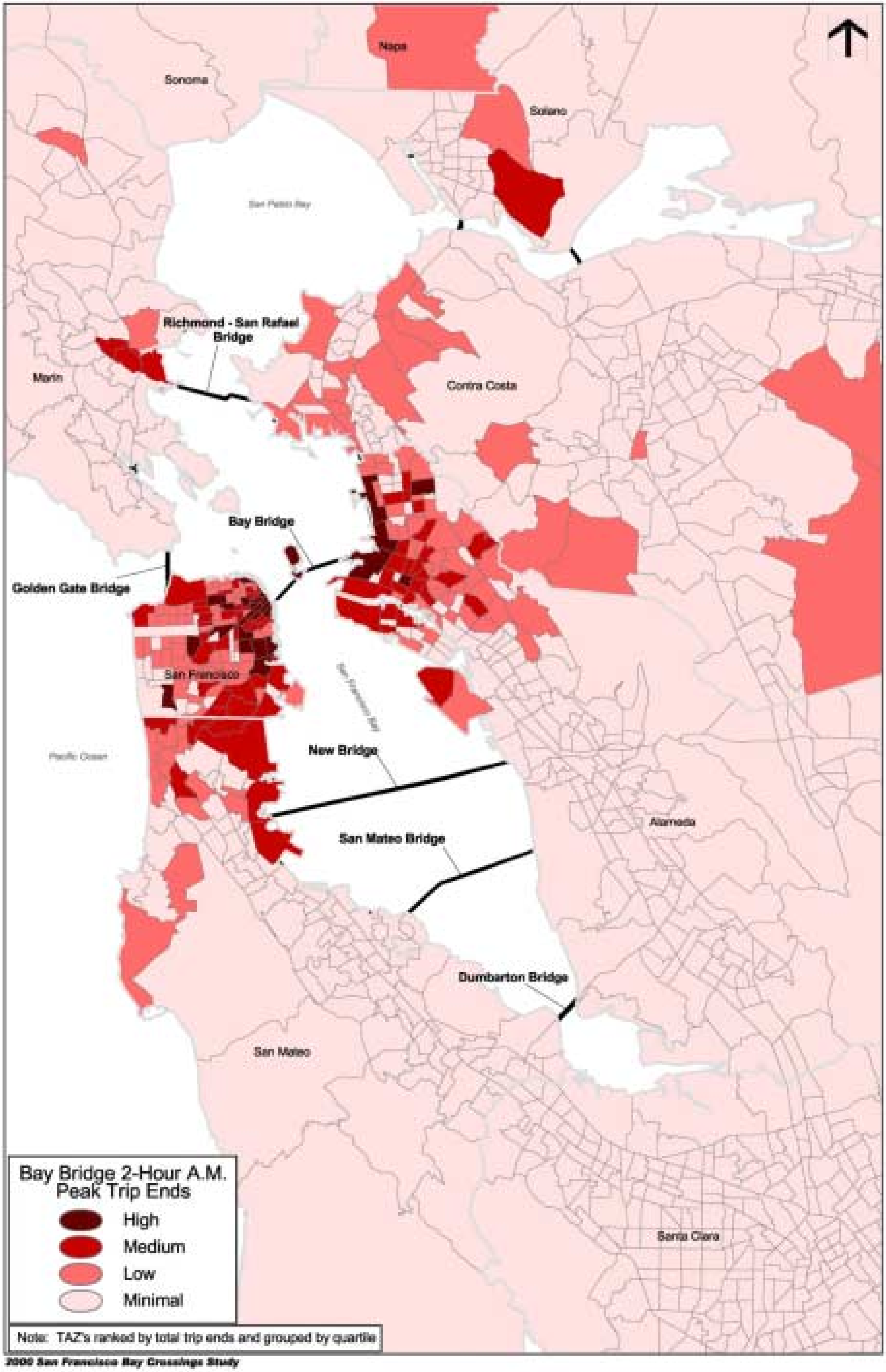
Dumbarton Bridge 2-Hour A.M. Peak Trip Ends
High
Medium
Low
Minimal
Note: TAZ's ranked by total trip ends and grouped by quartile
2000 San Francisco Bay Crossings Study
Dumbarton Bridge Crossings - Base Year 2025
February 2002

Figure 6



Napa
Sonoma
Solano
San Pablo Bay
Richmond - San Rafael Bridge
Marin
Contra Costa
Bay Bridge
Golden Gate Bridge
San Francisco
San Francisco Bay
Pacific Ocean
New Bridge
San Mateo Bridge
Alameda
Dumbarton Bridge
San Mateo
Santa Clara
New Bridge 2-Hour A.M. Peak Trip Ends
High
Medium
Low
Minimal
Note: TAZ's ranked by total trip ends and grouped by quartile
2000 San Francisco Bay Crossings Study
New Bridge Crossings - Year 2025
February 2002

Figure 7

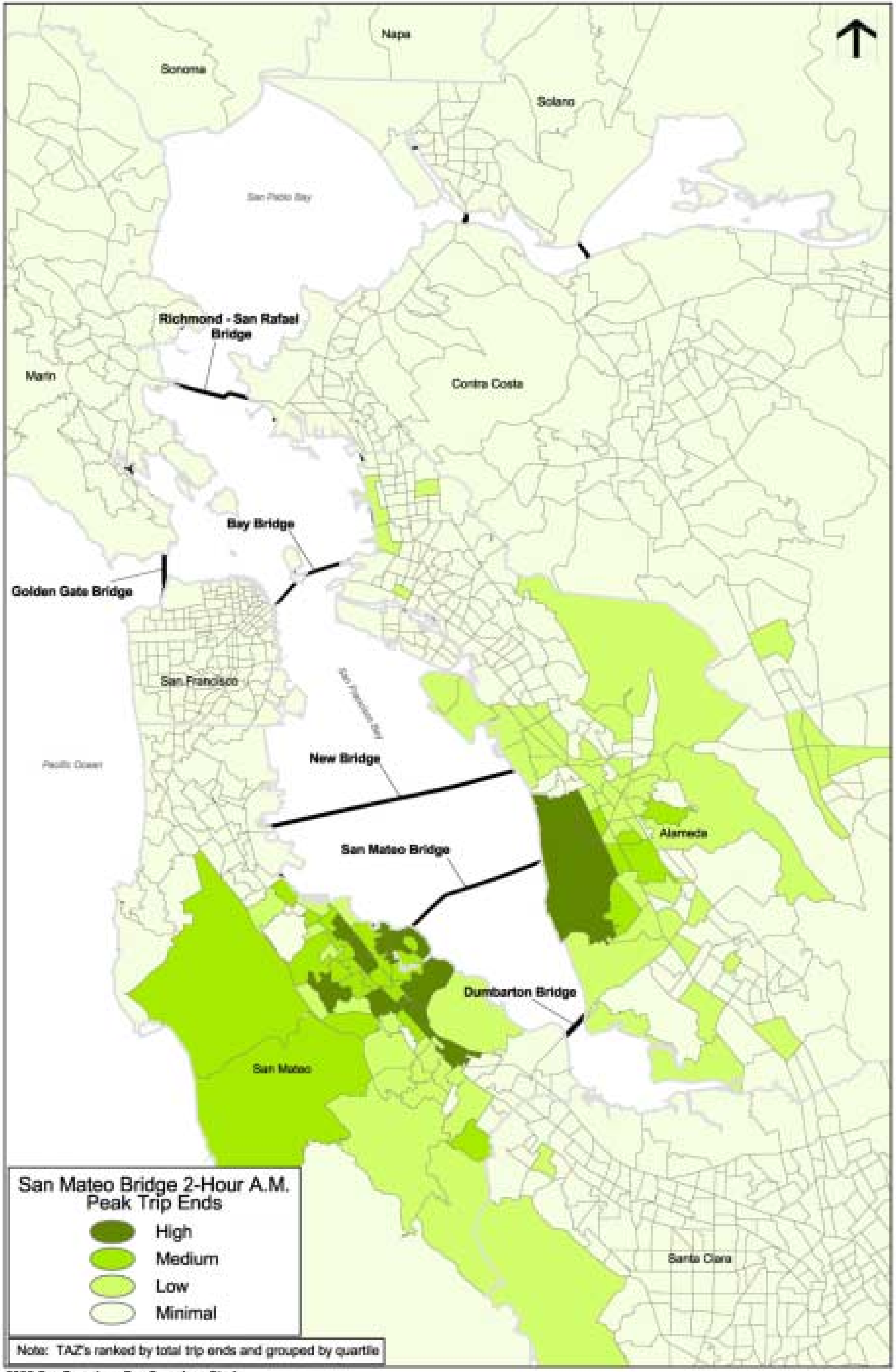


2000 San Francisco Bay Crossings Study

Bay Bridge Crossings - Year 2025 With New Bridge

February 2002

Figure 8

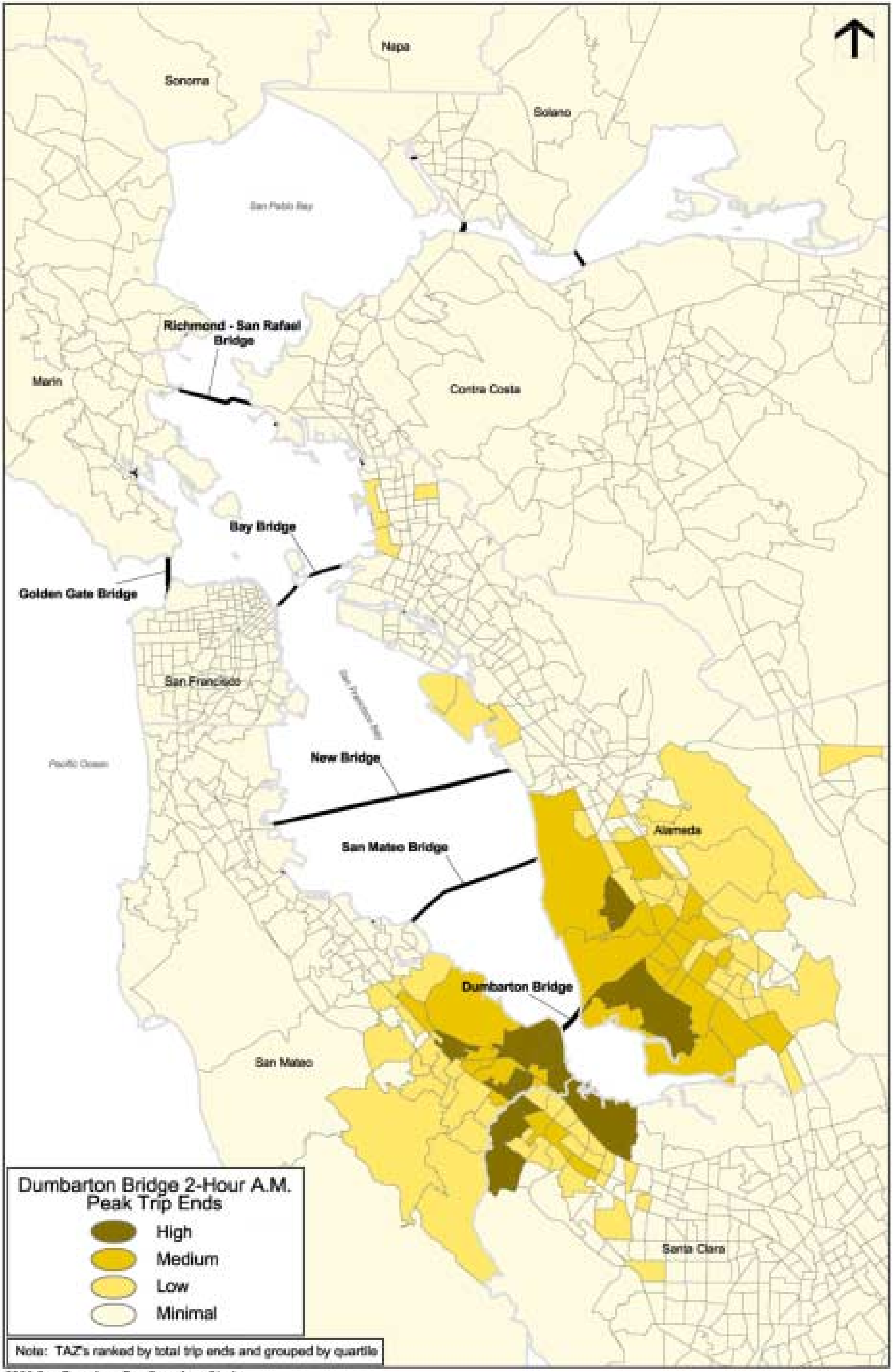


2000 San Francisco Bay Crossings Study

San Mateo Bridge Crossings - Year 2025 With New Bridge

February 2002

Figure 9



Dumbarton Bridge Crossings - Year 2025 With New Bridge

February 2002

Figure 10

Travel Time Comparison for Alternatives

The travel demand model was also used to compute travel times from trip origins to destinations by mode, for the major transbay origin/destination pairs identified in the select link analysis. Travel times have been computed for the major modes, including: Single Occupant Vehicles (SOV), HOV/carpools and transit (single service or combination of service). Transit travel times reported by the model include time spent traveling in transit vehicles as well as average wait times between modal and transit transfers.

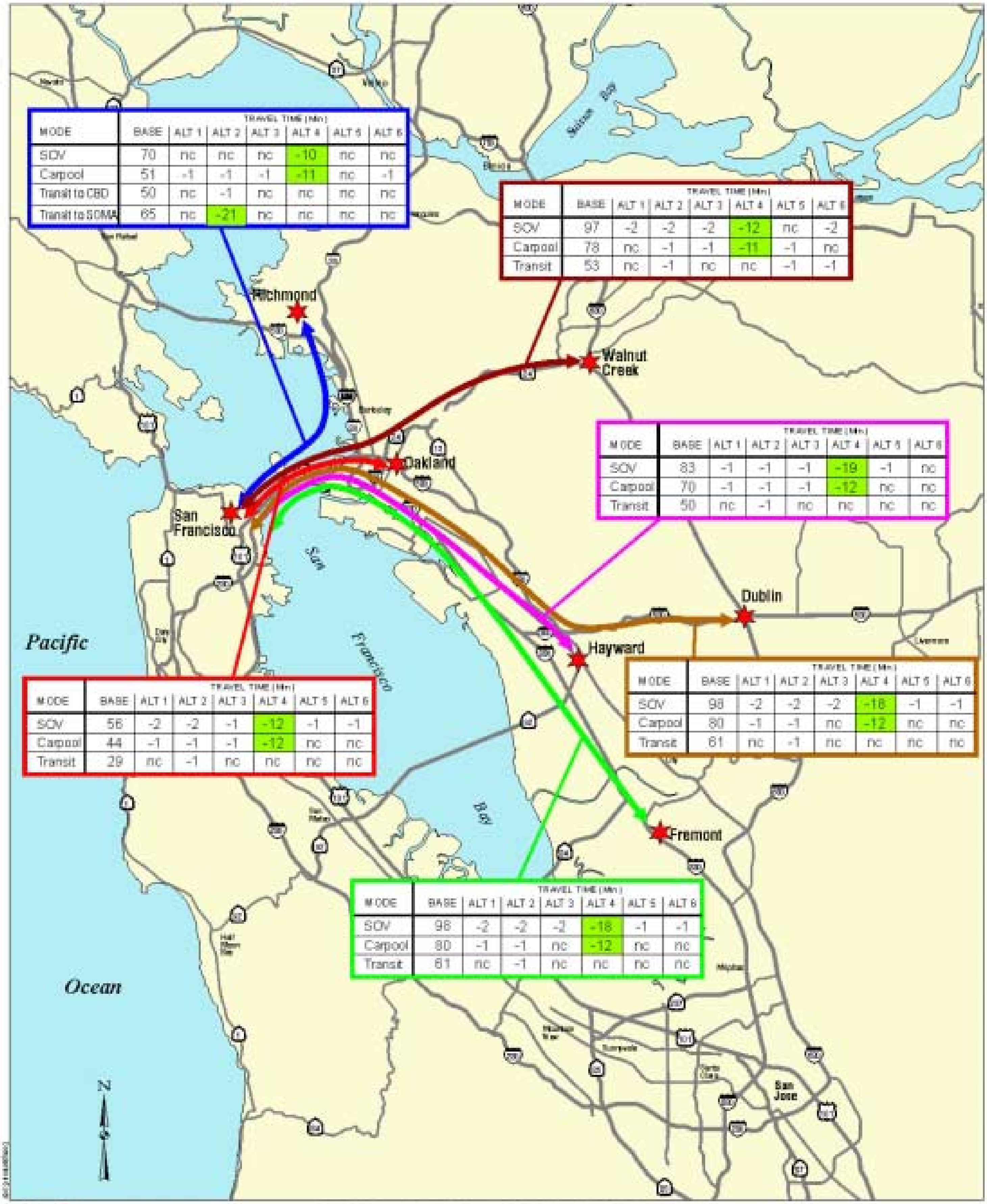
While the MTC travel demand model does report daily and evening peak hour information, it is most widely used to assess travel during the morning (a.m.) peak commute period. For this reason, the model has been queried with respect to travel times in the westbound direction during the morning peak period. Travel times to four West Bay destinations, San Francisco, San Mateo, Palo Alto and Mountain View, are reported from a set of major East Bay trip origins, as defined by the select link analysis. The results of this analysis are summarized in Figures 11 through 14.

Figure 11 presents the results of the travel time analysis to San Francisco. As presented in the Figure, most of the alternatives would result in minor decreases in travel times; only Alternative 4 would result in significant travel time improvements to the Financial District. For Single Occupant Vehicles and High Occupant Vehicles, Alternative 4 would result in 10 to 18 minutes of travel time savings from the six major East Bay destinations included in the analysis. Alternative 2 would result in a 21 minute transit travel time decrease from Richmond to the Mission Bay/South of Market Area. This travel time improvement would be a result of the new commuter rail service included as part of Alternative 2.

Figure 12 presents the results of the travel time analysis to San Mateo from major East Bay destinations. Again, as in the Bay Bridge corridor, most of the alternatives would result in minor decreases in corridor travel times. Depending on the East Bay origin, Alternative 3 would result in two to eight minute travel time savings for SOVs and HOVs. Alternative 4 would result in four to 15 minutes in travel time savings to San Mateo for SOVs and HOVs, depending on the East Bay origin. Alternative 1 would result in a 38 minute transit travel time savings from Hayward to San Mateo. This occurs because of the new express bus service included in Alternative 1 (this corridor currently does not have any existing transit service across the San Mateo Bridge, except for an employer shuttle).

Figure 13 presents the results of the travel time analysis to Palo Alto from major East Bay destinations identified in the select link analysis. Alternative 1 would result in 36 and 45 minutes of travel time savings from Fremont and Hayward as a result of the new express bus service included as part of this package. The new Dumbarton Bridge commuter rail service included in Alternative 5 would result in 17, 21 and 40 minutes of travel time savings to Palo Alto from Dublin, Livermore and Fremont, respectively (assumes expanded service scenario).

Finally, as presented in Figure 14, the alternative packages would not substantially affect most automobile and transit trip travel times to Mountain View. Alternative 5 would result in a 9 minute travel time decrease from Dublin to Mountain View.



Travel times to San Francisco from Richmond:

MODE	TRAVEL TIME (Min) BASE	ALT 1	ALT 2	ALT 3	ALT 4	ALT 5	ALT 6
SOV	70	nc	nc	nc	-10	nc	nc
Carpool	51	-1	-1	-1	-11	nc	-1
Transit to CBD	50	nc	-1	nc	nc	nc	nc
Transit to SOMA	65	nc	-21	nc	nc	nc	nc

Travel times to San Francisco from Walnut Creek:

MODE	TRAVEL TIME (Min) BASE	ALT 1	ALT 2	ALT 3	ALT 4	ALT 5	ALT 6
SOV	97	-2	-2	-2	-12	nc	-2
Carpool	78	nc	-1	-1	-11	-1	nc
Transit	53	nc	-1	nc	nc	-1	-1

Travel times to San Francisco from Hayward:

MODE	TRAVEL TIME (Min) BASE	ALT 1	ALT 2	ALT 3	ALT 4	ALT 5	ALT 6
SOV	83	-1	-1	-1	-19	-1	nc
Carpool	70	-1	-1	-1	-12	nc	nc
Transit	50	nc	-1	nc	nc	nc	nc

Travel times to San Francisco from Dublin:

MODE	TRAVEL TIME (Min) BASE	ALT 1	ALT 2	ALT 3	ALT 4	ALT 5	ALT 6
SOV	98	-2	-2	-2	-18	-1	-1
Carpool	80	-1	-1	nc	-12	nc	nc
Transit	61	nc	-1	nc	nc	nc	nc

Travel times to San Francisco from Oakland:

MODE	TRAVEL TIME (Min) BASE	ALT 1	ALT 2	ALT 3	ALT 4	ALT 5	ALT 6
SOV	56	-2	-2	-1	-12	-1	-1
Carpool	44	-1	-1	-1	-12	nc	nc
Transit	29	nc	-1	nc	nc	nc	nc

Travel times to San Francisco from Fremont:

MODE	TRAVEL TIME (Min) BASE	ALT 1	ALT 2	ALT 3	ALT 4	ALT 5	ALT 6
SOV	98	-2	-2	-2	-18	-1	-1
Carpool	80	-1	-1	nc	-12	nc	nc
Transit	61	nc	-1	nc	nc	nc	nc

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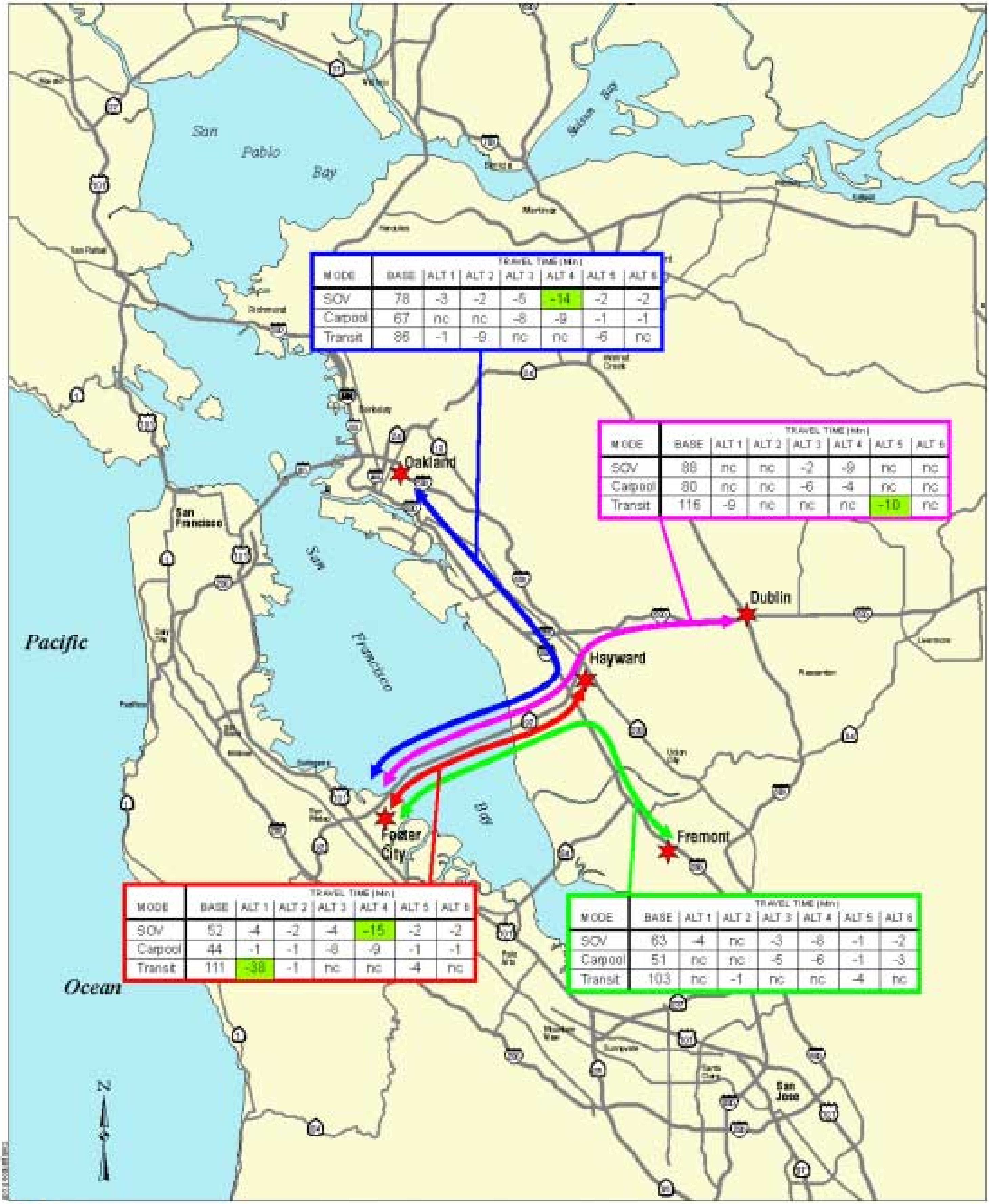
TRAVEL TIME COMPARISON

TRAVEL TIMES TO SAN FRANCISCO

from Oakland, Richmond, Walnut Creek, Hayward, Dublin and Fremont
(AM Peak Hour, Westbound)

2000 San Francisco Bay Crossings Study

Figure 11



MODE	TRAVEL TIME (Min) BASE	ALT 1	ALT 2	ALT 3	ALT 4	ALT 5	ALT 6
SOV	78	-3	-2	-5	-14	-2	-2
Carpool	67	nc	nc	-8	-9	-1	-1
Transit	86	-1	-9	nc	nc	-6	nc

MODE	TRAVEL TIME (Min) BASE	ALT 1	ALT 2	ALT 3	ALT 4	ALT 5	ALT 6
SOV	88	nc	nc	-2	-9	nc	nc
Carpool	80	nc	nc	-6	-4	nc	nc
Transit	116	-9	nc	nc	nc	-10	nc

MODE	TRAVEL TIME (Min) BASE	ALT 1	ALT 2	ALT 3	ALT 4	ALT 5	ALT 6
SOV	52	-4	-2	-4	-15	-2	-2
Carpool	44	-1	-1	-8	-9	-1	-1
Transit	111	-38	-1	nc	nc	-4	nc

MODE	TRAVEL TIME (Min) BASE	ALT 1	ALT 2	ALT 3	ALT 4	ALT 5	ALT 6
SOV	63	-4	nc	-3	-8	-1	-2
Carpool	51	nc	nc	-5	-6	-1	-3
Transit	103	nc	-1	nc	nc	-4	nc

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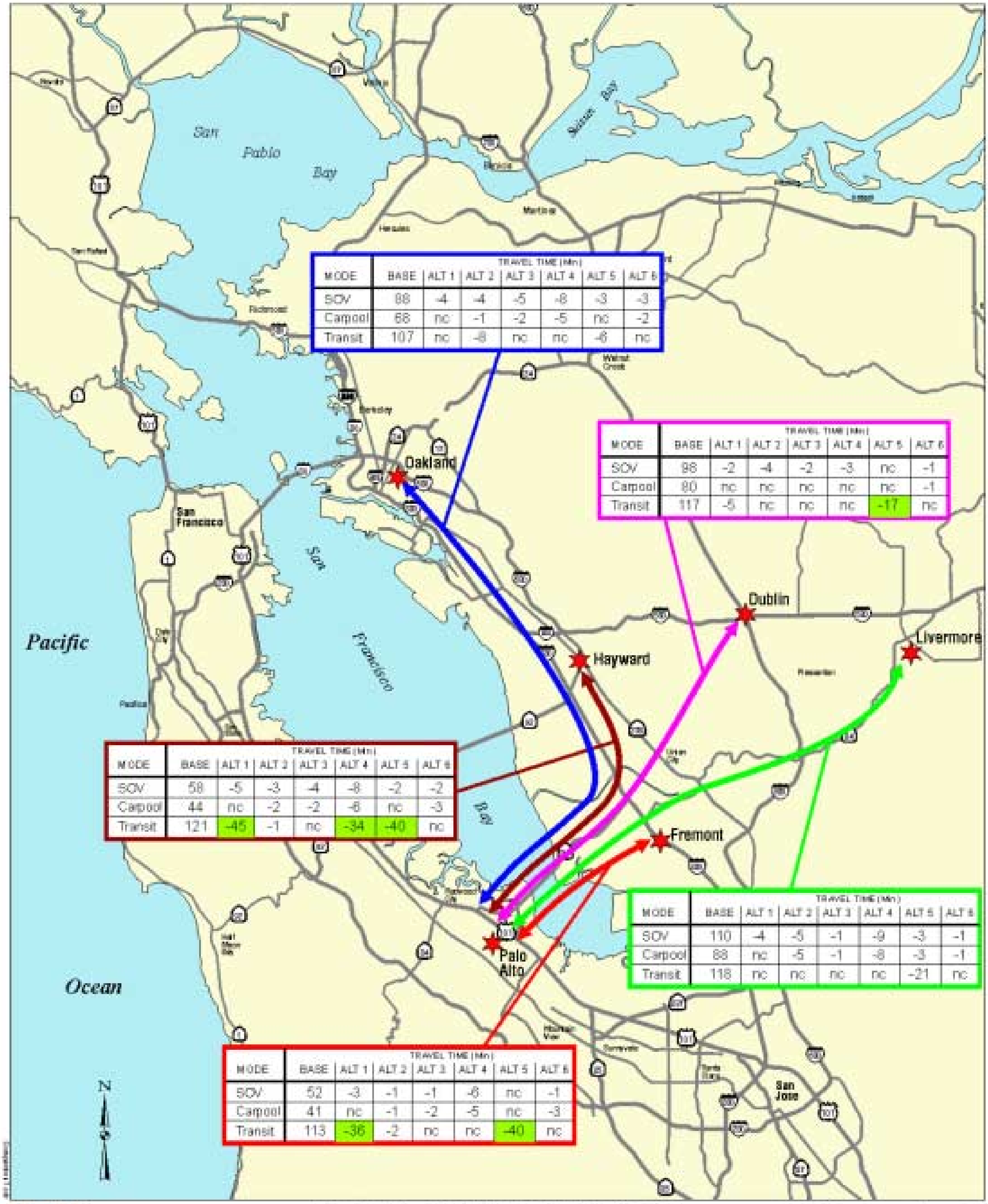
TRAVEL TIME COMPARISON

TRAVEL TIMES TO SAN MATEO

from Oakland, Hayward, Dublin and Fremont
(AM Peak Hour, Westbound)

2000 San Francisco Bay Crossings Study

Figure 12



MODE	BASE	ALT 1	ALT 2	ALT 3	ALT 4	ALT 5	ALT 6
	TRAVEL TIME (Min)						
SOV	88	-4	-4	-5	-8	-3	-3
Carpool	66	nc	-1	-2	-5	nc	-2
Transit	107	nc	-8	nc	nc	-6	nc

MODE	BASE	ALT 1	ALT 2	ALT 3	ALT 4	ALT 5	ALT 6
	TRAVEL TIME (Min)						
SOV	96	-2	-4	-2	-3	nc	-1
Carpool	80	nc	nc	nc	nc	nc	-1
Transit	117	-5	nc	nc	nc	-17	nc

MODE	BASE	ALT 1	ALT 2	ALT 3	ALT 4	ALT 5	ALT 6
	TRAVEL TIME (Min)						
SOV	58	-5	-3	-4	-8	-2	-2
Carpool	44	nc	-2	-2	-6	nc	-3
Transit	121	-45	-1	nc	-34	-40	nc

MODE	BASE	ALT 1	ALT 2	ALT 3	ALT 4	ALT 5	ALT 6
	TRAVEL TIME (Min)						
SOV	110	-4	-5	-1	-9	-3	-1
Carpool	88	nc	-5	-1	-8	-3	-1
Transit	118	nc	nc	nc	nc	-21	nc

MODE	BASE	ALT 1	ALT 2	ALT 3	ALT 4	ALT 5	ALT 6
	TRAVEL TIME (Min)						
SOV	52	-3	-1	-1	-6	nc	-1
Carpool	41	nc	-1	-2	-5	nc	-3
Transit	113	-36	-2	nc	nc	-40	nc

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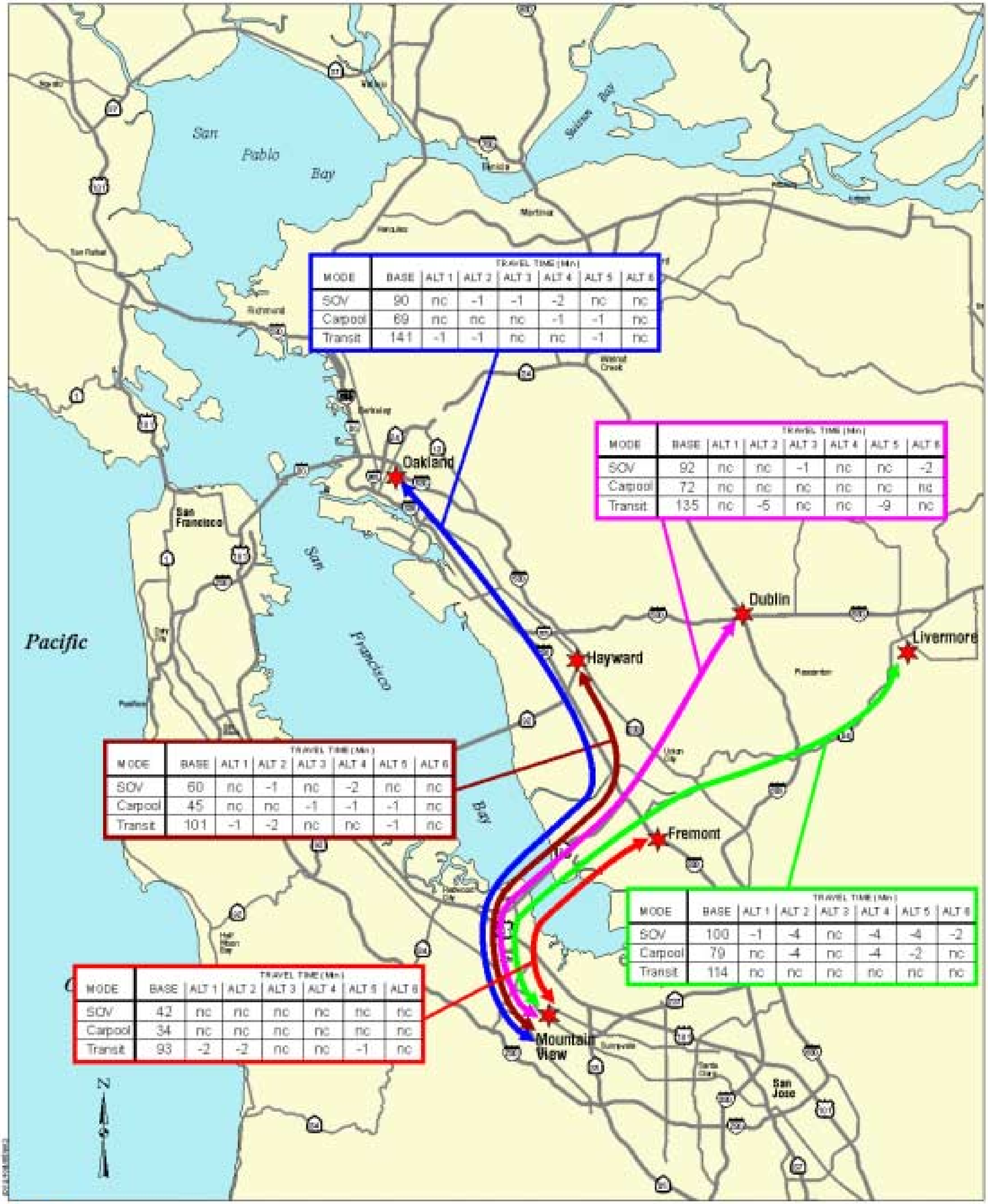
TRAVEL TIME COMPARISON

TRAVEL TIMES TO PALO ALTO

from Oakland, Hayward, Dublin, Livermore and Fremont
(AM Peak Hour, Westbound)

2000 San Francisco Bay Crossings Study

Figure 13



Oakland (TRAVEL TIME (Min))

MODE	BASE	ALT 1	ALT 2	ALT 3	ALT 4	ALT 5	ALT 6
SOV	90	nc	-1	-1	-2	nc	nc
Carpool	69	nc	nc	nc	-1	-1	nc
Transit	141	-1	-1	nc	nc	-1	nc

Dublin (TRAVEL TIME (Min))

MODE	BASE	ALT 1	ALT 2	ALT 3	ALT 4	ALT 5	ALT 6
SOV	92	nc	nc	-1	nc	nc	-2
Carpool	72	nc	nc	nc	nc	nc	nc
Transit	135	nc	-5	nc	nc	-9	nc

Hayward (TRAVEL TIME (Min))

MODE	BASE	ALT 1	ALT 2	ALT 3	ALT 4	ALT 5	ALT 6
SOV	60	nc	-1	nc	-2	nc	nc
Carpool	45	nc	nc	-1	-1	-1	nc
Transit	101	-1	-2	nc	nc	-1	nc

Livermore (TRAVEL TIME (Min))

MODE	BASE	ALT 1	ALT 2	ALT 3	ALT 4	ALT 5	ALT 6
SOV	100	-1	-4	nc	-4	-4	-2
Carpool	79	nc	-4	nc	-4	-2	nc
Transit	114	nc	nc	nc	nc	nc	nc

Fremont (TRAVEL TIME (Min))

MODE	BASE	ALT 1	ALT 2	ALT 3	ALT 4	ALT 5	ALT 6
SOV	42	nc	nc	nc	nc	nc	nc
Carpool	34	nc	nc	nc	nc	nc	nc
Transit	93	-2	-2	nc	nc	-1	nc

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TRAVEL TIME COMPARISON

TRAVEL TIMES TO MOUNTAIN VIEW

from Oakland, Hayward, Dublin and Fremont
(AM Peak Hour, Westbound)

2000 San Francisco Bay Crossings Study

Figure 14

Automobile Traffic by Alternative

The main objective of this section is to summarize the impact of each alternative on transbay automobile travel. Traffic conditions have been analyzed for the transbay crossings as well as major east bay and west bay freeways leading to the bridges to ascertain total traffic volumes as well as shifts in congestion from one portion of the system to another.

Transbay Vehicular Capacity

Table 2 presents a summary of transbay vehicular capacity across study screen-lines. The figures presented are hourly in the westbound direction. A capacity of 2,000 vehicles per hour per lane is assumed.

Table 2
Vehicular Capacity - AM Peak Hour - Westbound

Crossing	**1998**	**2025 Baseline**	**Alt 1 Exp Bus/ HOV**	**Alt 2 Bay Bridge Rail**	**Alt 3 SMB Widening**	**Alt 4 New Mid-Bay Bridge**	**Alt 5 Dumb Rail**	**Alt 6 Dumb Approach**
Bay Bridge	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000
San Mateo Bridge	4,000	6,000	6,000	6,000	8,000	6,000	6,000	6,000
Dumbarton Bridge	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000
New Mid-Bay Bridge	-	-	-	-	-	6,000	-	-
TOTAL	20,000	22,000	22,000	22,000	24,000	28,000	22,000	22,000

Daily and Peak Screen-line Traffic Volumes

Table 3 presents daily vehicle volumes on each of the study area's main crossings. Vehicular volumes include both single occupant vehicles and high occupant vehicles (carpools). As presented in Table 3, transbay travel will grow by more than 40 percent from 625,000 daily vehicle trips in 1998 to 878,000 daily vehicle trips in 2025 (includes both directions). The new Mid-Bay Bridge included in Alternative 4, would serve approximately 86,000 daily vehicle trips.

Table 3
Daily Vehicle Volumes (Two Directions)

Crossing	**1998**	**2025 Baseline**	**Alt 1 Exp Bus/ HOV**	**Alt 2 Bay Bridge Rail**	**Alt 3 SMB Widening**	**Alt 4 New Mid-Bay Bridge**	**Alt 5 Dumb Rail**	**Alt 6 Dumb Approach**
Bay Bridge	325,800	425,200	423,600	420,300	424,600	401,900	424,500	424,300
San Mateo Bridge	99,900	159,500	155,700	157,200	164,500	121,200	157,600	147,400
Dumbarton Bridge	77,700	101,400	101,700	102,700	100,500	103,300	101,000	124,000
SR 237	121,700	191,900	185,000	182,200	189,400	180,100	188,200	179,200
New Mid-Bay Bridge	---	---	---	---	---	86,100	---	---
TOTAL	625,100	878,000	865,900	862,500	879,000	892,700	871,300	874,900

Table 4 summarizes the four-hour morning peak period vehicle volumes on the study facilities. Peak period travel would also grow by approximately 40 percent from 1998 to 2025, from 146,000 to 205,000 vehicles in the four hour peak period. The new Mid-Bay Bridge included in Alternative 4 would serve approximately 32,000 vehicles in the morning peak period, or about 8,000 vehicles per hour.

Table 4
AM Peak
4-Hour Peak Period Vehicle Volumes

Crossing	Dir	1998	2025 Baseline	Alt 1 Exp Bus/ HOV	Alt 2 Bay Br Rail	Alt 3 SMB Widening	Alt 4 Mid-Bay Bridge	Alt 5 Dumb Rail	Alt 6 Dumb Approach
Bay Bridge	EB	28,100	38,300	38,100	38,000	38,100	34,200	38,300	38,300
	WB	39,700	47,600	47,100	47,200	47,000	41,900	47,500	47,600
San Mateo Bridge	EB	10,100	18,000	17,700	17,900	18,800	14,300	18,000	17,900
	WB	16,200	24,200	24,000	23,900	27,000	20,100	24,000	24,000
Dumbarton Bridge	EB	6,700	13,700	13,700	13,600	13,200	12,100	13,700	14,000
	WB	17,000	23,200	24,000	23,100	22,400	20,200	22,900	24,700
SR 237	EB	11,900	17,900	17,700	17,800	17,900	17,800	17,800	17,800
	WB	16,600	21,800	21,500	21,800	21,500	20,800	21,600	21,300
New Mid-Bay Bridge	EB	---	---	---	---	---	10,600	---	---
	WB	---	---	---	---	---	21,300	---	---
TOTAL		146,200	204,700	203,300	203,400	205,800	213,200	203,800	205,600

Peak Period Volume-to-Capacity Ratios

Peak period traffic analysis has been conducted on more than 20 freeway screen-lines (a selected location on the freeway or link) in the study area. These screen-lines include all bay crossing facilities as well as critical approaches and major north-south freeway links on either side of the bay. Figure 15 illustrates peak direction volume-to-capacity ratios on study freeway segments for the morning peak period. For those facilities operating near capacity (defined as v/c > 0.80), major changes brought about by the proposed alternatives are highlighted in color. Of the six alternatives, only three (Alternatives 3, 4 and 6) were identified as having significant peak period volume to capacity ratio changes on these facilities.

<u>Alternative 3 (San Mateo Bridge Widening to 8 Lanes)</u>

As presented on Figure 15, Alternative 3 would improve the volume to capacity ratio on the San Mateo Bridge from 1.03 in the 2025 Baseline condition to 0.87. Similarly, Alternative 3 would improve the v/c ratio on I-880 between I-238 and SR 92 from 0.93 in the 2025 Baseline to 0.88 (the alternative includes the widening of this stretch of freeway to 10 lanes). Alternative 3 would also improve the v/c ratio on the Dumbarton Bridge from 0.97 in the 2025 Baseline condition to 0.93 with the alternative. Finally, Alternative 3 would increase the volume to capacity ratio on I-238 between I-580 and I-880 from 0.81 to 0.86.

<u>Alternative 4 (New Mid-Bay Bridge)</u>

Alternative 4 would have the most dramatic effects on the volume to capacity ratios of study area facilities. Volume to capacity ratios would decrease measurably on the Bay Bridge (1.25 to 1.10), San Mateo Bridge (1.03 to 0.86) and Dumbarton Bridge (0.97 to 0.84). As illustrated on Figure 15, positive changes could also be expected on eastbound I-380, northbound US 101 between SR 92 and I-380, westbound University Avenue and northbound I-580 north of I-238. Alternative 4 would increase the volume to capacity ratio on westbound I-238 between I-580 and I-880 (0.81 in 2025 Baseline to 0.90 with Alternative 4).

<u>Alternative 6 (University Avenue/East Palo Alto Bypass)</u>

Alternative 6 would also have measurable impacts on several area roadways. As illustrated on Figure 15, Alternative 6 would improve the volume to capacity ratio on westbound University Avenue in the morning peak hour from 0.82 to 0.57. The alternative would increase the v/c ratio on the westbound Dumbarton Bridge from 0.97 in the 2025 Baseline condition to 1.03 with the alternative as additional vehicles could be served with an improved West Bay access road system.

Peak Period Hours of Delay

Similar to the v/c analysis discussed above, peak period hours of delay have been calculated for more than 20 freeway areas. These "areas" are presented on Figure 16 and include all bay crossing facilities as well as critical approaches and major north-south freeway links on either side of the bay. Delay has been calculated and reported for a two-hour morning peak period. For those facilities operating near capacity (defined as v/c > 0.80), major changes brought about by the proposed alternatives are highlighted in color. Of the six alternatives, only three (Alternatives 3, 4 and 6) were identified as having significant effects on peak period hours of delay on these facilities.

<u>Alternative 3 (San Mateo Bridge Widening)</u>

As presented on Figure 16, Alternative 3 would reduce morning peak period delays on the San Mateo Bridge (from 2,000 hours in the Baseline condition to 1,600 vehicle hours with Alternative 3). With the assumed widening of I-880, Alternative 3 would also benefit I-880 between I-238 and SR 92 (decrease in delay from 1,100 vehicle hours in the Baseline to 700 hours with Alternative 3) and the Dumbarton Bridge west approach roadways (University Avenue, Willow Road and SR 84). Finally, Alternative 3 would have a negative impact on I-238 between I-880 and I-580, increasing the two hour delay from 190 to 230 vehicle hours.

<u>Alternative 4 (New Mid-Bay Bridge)</u>

As with volume to capacity ratios, Alternative 4 would have the most dramatic effects on delay on study area facilities. Due to the significant addition of vehicle capacity, Alternative 4 is the only option that would measurably affect the overall system-wide delay, presented in the legend of Figure 16. The alternative would decrease overall delay on all measured facilities by 12.6 percent from 47,600 to 41,600 vehicle hours during the two hour morning peak period. Alternative 4 would decrease vehicular delay on the Bay Bridge (4,600 vehicle hours in the 2025 Baseline alternative to 2,500 vehicle hours with Alternative 4), San Mateo Bridge (2,000 to 700 vehicle hours) and the Dumbarton Bridge (100 to less than 100 vehicle hours). Due to its potential redistribution of traffic over a large area, the New Mid-Bay Bridge would also have positive impacts on I-580 north of I-238, the Dumbarton Bridge west approach roadways, SR 92 between US 101 and I-280, US 101 between I-380 and SR 92, and I-380. Negative impacts would occur on I-238 between I-580 and I-880 and US 101 between I-280 and I-380.

<u>Alternative 6 (University Avenue/East Palo Alto Bypass)</u>

Alternative 6 would reduce the two hour morning peak delay on the west Dumbarton Bridge approach roadways from 550 vehicle hours in the 2025 Baseline condition to 60 vehicle hours with the new direct southerly approach to and from US 101.

Daily Person Trips

Table 5 presents a summary of the daily person trips on the study's key crossing facilities – the Bay Bridge, San Mateo Bridge, Dumbarton Bridge and New Mid-Bay Bridge (under Alternative 4). A number of the alternatives would have notable effects on transbay SOV and HOV travel.

<u>Alternative 3 (San Mateo Bridge Widening to 8 Lanes)</u>

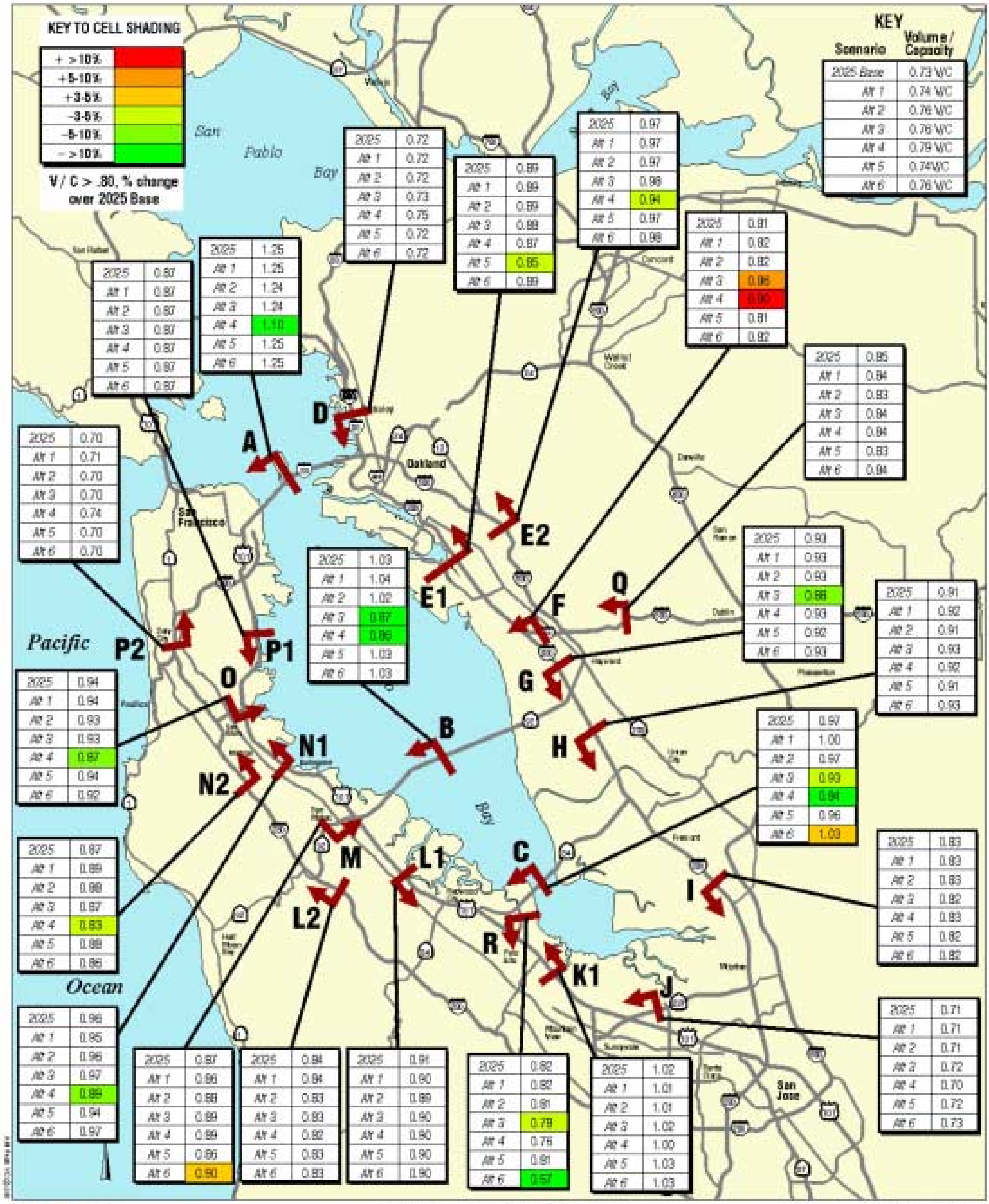
Alternative 3 would result in an increase in daily person trips across the San Mateo Bridge of approximately five percent. The bulk of this increase would consist of carpools, which would increase by 22 percent over the 2025 Baseline condition. Single Occupant Vehicles on the San Mateo Bridge would only increase by one percent under Alternative 3.

Alternative 4 (New Mid-Bay Bridge)

Alternative 4 would have notable impacts on daily person trips in the Bay Bridge and San Mateo Bridge Corridors. On the Bay Bridge, SOVs are expected to fall by six percent, with carpools rising by approximately two percent. The New Mid-Bay Bridge would decrease daily travel over the San Mateo Bridge by approximately 24 percent.

Alternative 6 (University Avenue/East Palo Alto Bypass)

Alternative 6 would increase daily vehicle travel across the Dumbarton Bridge and decrease daily travel across the San Mateo Bridge. The number of persons crossing the Dumbarton Bridge in SOVs would increase by 26 percent under Alternative 6, with the number of persons crossing the bridge in HOVs increasing by 53 percent. The decrease in daily person trips across the San Mateo Bridge would be nine percent.



Scenario	Volume / Capacity
2025 Base	0.73 V/C
Alt 1	0.74 V/C
Alt 2	0.76 V/C
Alt 3	0.76 V/C
Alt 4	0.79 V/C
Alt 5	0.74 V/C
Alt 6	0.76 V/C

2025	0.87
Alt 1	0.87
Alt 2	0.87
Alt 3	0.87
Alt 4	0.87
Alt 5	0.87
Alt 6	0.87

2025	1.25
Alt 1	1.25
Alt 2	1.24
Alt 3	1.24
Alt 4	1.10
Alt 5	1.25
Alt 6	1.25

2025	0.72
Alt 1	0.72
Alt 2	0.72
Alt 3	0.73
Alt 4	0.75
Alt 5	0.72
Alt 6	0.72

2025	0.89
Alt 1	0.89
Alt 2	0.89
Alt 3	0.88
Alt 4	0.87
Alt 5	0.85
Alt 6	0.89

2025	0.97
Alt 1	0.97
Alt 2	0.97
Alt 3	0.98
Alt 4	0.94
Alt 5	0.97
Alt 6	0.98

2025	0.81
Alt 1	0.82
Alt 2	0.82
Alt 3	0.86
Alt 4	0.90
Alt 5	0.81
Alt 6	0.82

2025	0.85
Alt 1	0.84
Alt 2	0.83
Alt 3	0.84
Alt 4	0.84
Alt 5	0.83
Alt 6	0.84

2025	0.70
Alt 1	0.71
Alt 2	0.70
Alt 3	0.70
Alt 4	0.74
Alt 5	0.70
Alt 6	0.70

2025	1.03
Alt 1	1.04
Alt 2	1.02
Alt 3	0.97
Alt 4	0.96
Alt 5	1.03
Alt 6	1.03

2025	0.93
Alt 1	0.93
Alt 2	0.93
Alt 3	0.88
Alt 4	0.93
Alt 5	0.92
Alt 6	0.93

2025	0.91
Alt 1	0.92
Alt 2	0.91
Alt 3	0.93
Alt 4	0.92
Alt 5	0.91
Alt 6	0.93

2025	0.94
Alt 1	0.94
Alt 2	0.93
Alt 3	0.93
Alt 4	0.87
Alt 5	0.94
Alt 6	0.92

2025	0.97
Alt 1	1.00
Alt 2	0.97
Alt 3	0.93
Alt 4	0.84
Alt 5	0.96
Alt 6	1.03

2025	0.87
Alt 1	0.89
Alt 2	0.88
Alt 3	0.87
Alt 4	0.83
Alt 5	0.88
Alt 6	0.86

2025	0.83
Alt 1	0.83
Alt 2	0.83
Alt 3	0.82
Alt 4	0.83
Alt 5	0.82
Alt 6	0.82

2025	0.96
Alt 1	0.95
Alt 2	0.96
Alt 3	0.97
Alt 4	0.89
Alt 5	0.94
Alt 6	0.97

2025	0.87
Alt 1	0.86
Alt 2	0.88
Alt 3	0.89
Alt 4	0.89
Alt 5	0.86
Alt 6	0.90

2025	0.84
Alt 1	0.84
Alt 2	0.83
Alt 3	0.83
Alt 4	0.82
Alt 5	0.83
Alt 6	0.83

2025	0.91
Alt 1	0.90
Alt 2	0.89
Alt 3	0.90
Alt 4	0.90
Alt 5	0.90
Alt 6	0.90

2025	0.82
Alt 1	0.82
Alt 2	0.81
Alt 3	0.78
Alt 4	0.76
Alt 5	0.81
Alt 6	0.57

2025	1.02
Alt 1	1.01
Alt 2	1.01
Alt 3	1.02
Alt 4	1.00
Alt 5	1.03
Alt 6	1.03

2025	0.71
Alt 1	0.71
Alt 2	0.71
Alt 3	0.72
Alt 4	0.70
Alt 5	0.72
Alt 6	0.73

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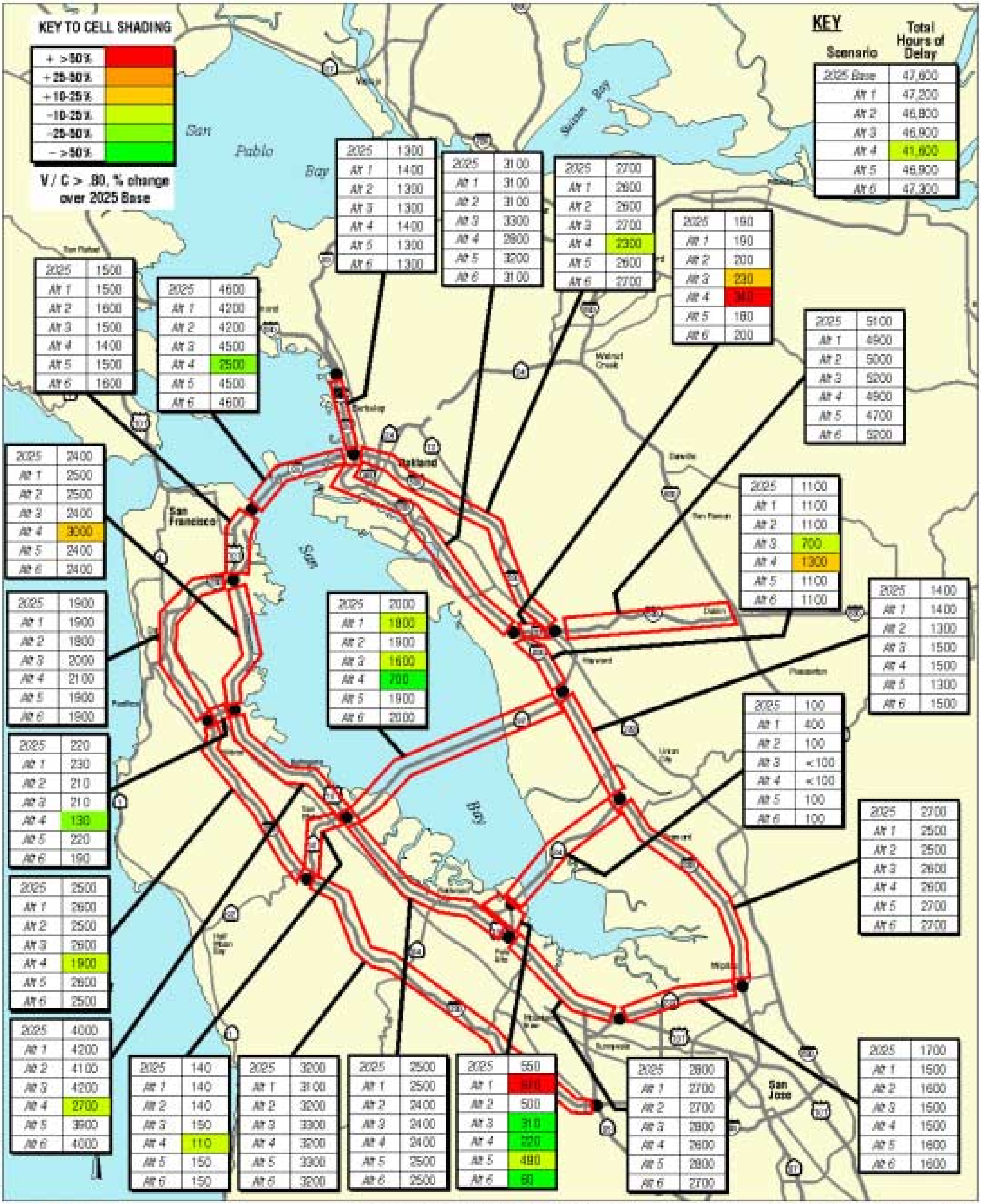
TRAFFIC ANALYSIS
AM PEAK PERIOD V/C RATIOS

2000 San Francisco Bay Crossings Study

Figure 15



KEY TO CELL SHADING

+ >50%	
+25-50%	
+10-25%	
-10-25%	
-25-50%	
- >50%	

V / C > .80, % change over 2025 Base

KEY

Scenario	Total Hours of Delay
2025 Base	47,600
Alt 1	47,200
Alt 2	46,800
Alt 3	46,900
Alt 4	41,600
Alt 5	46,900
Alt 6	47,300

2025	1300
Alt 1	1400
Alt 2	1300
Alt 3	1300
Alt 4	1400
Alt 5	1300
Alt 6	1300

2025	3100
Alt 1	3100
Alt 2	3100
Alt 3	3300
Alt 4	2800
Alt 5	3200
Alt 6	3100

2025	2700
Alt 1	2600
Alt 2	2600
Alt 3	2700
Alt 4	2300
Alt 5	2600
Alt 6	2700

2025	190
Alt 1	190
Alt 2	200
Alt 3	230
Alt 4	360
Alt 5	180
Alt 6	200

2025	1500
Alt 1	1500
Alt 2	1600
Alt 3	1500
Alt 4	1400
Alt 5	1500
Alt 6	1600

2025	4600
Alt 1	4200
Alt 2	4200
Alt 3	4500
Alt 4	2500
Alt 5	4500
Alt 6	4600

2025	5100
Alt 1	4900
Alt 2	5000
Alt 3	5200
Alt 4	4900
Alt 5	4700
Alt 6	5200

2025	2400
Alt 1	2500
Alt 2	2500
Alt 3	2400
Alt 4	3000
Alt 5	2400
Alt 6	2400

2025	1100
Alt 1	1100
Alt 2	1100
Alt 3	700
Alt 4	1300
Alt 5	1100
Alt 6	1100

2025	1400
Alt 1	1400
Alt 2	1300
Alt 3	1500
Alt 4	1500
Alt 5	1300
Alt 6	1500

2025	1900
Alt 1	1900
Alt 2	1800
Alt 3	2000
Alt 4	2100
Alt 5	1900
Alt 6	1900

2025	2000
Alt 1	1800
Alt 2	1900
Alt 3	1600
Alt 4	700
Alt 5	1900
Alt 6	2000

2025	220
Alt 1	230
Alt 2	210
Alt 3	210
Alt 4	130
Alt 5	220
Alt 6	190

2025	100
Alt 1	400
Alt 2	100
Alt 3	<100
Alt 4	<100
Alt 5	100
Alt 6	100

2025	2700
Alt 1	2500
Alt 2	2500
Alt 3	2600
Alt 4	2600
Alt 5	2700
Alt 6	2700

2025	2500
Alt 1	2600
Alt 2	2500
Alt 3	2600
Alt 4	1900
Alt 5	2600
Alt 6	2500

2025	4000
Alt 1	4200
Alt 2	4100
Alt 3	4200
Alt 4	2700
Alt 5	3900
Alt 6	4000

2025	140
Alt 1	140
Alt 2	140
Alt 3	150
Alt 4	110
Alt 5	150
Alt 6	150

2025	3200
Alt 1	3100
Alt 2	3200
Alt 3	3300
Alt 4	3200
Alt 5	3300
Alt 6	3200

2025	2500
Alt 1	2500
Alt 2	2400
Alt 3	2400
Alt 4	2400
Alt 5	2500
Alt 6	2500

2025	550
Alt 1	[illegible]
Alt 2	500
Alt 3	310
Alt 4	220
Alt 5	490
Alt 6	60

2025	2800
Alt 1	2700
Alt 2	2700
Alt 3	2800
Alt 4	2600
Alt 5	2800
Alt 6	2700

2025	1700
Alt 1	1500
Alt 2	1600
Alt 3	1500
Alt 4	1500
Alt 5	1600
Alt 6	1600

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TRAFFIC ANALYSIS
2 HOUR AM PEAK PERIOD HOURS OF DELAY

2000 San Francisco Bay Crossings Study

Figure 16

Table 5
Daily Person Trips at Study Screen-lines (Automobile Traffic Only)

Bay Bridge Corridor	2025 Baseline		Alternative 1		Alternative 2		Alternative 3		Alternative 4		Alternative 5		Alternative 6	
	Persons	Percent	Persons	Change	Persons	Change	Persons	Change	Persons	Change	Persons	Change	Persons	Change
Single Occupant Vehicle	386,000	79%	384,000	0%	382,000	-1%	386,000	0%	363,000	-6%	386,000	0%	386,000	0%
Carpool	105,000	21%	105,000	0%	102,000	-2%	103,000	-2%	107,000	2%	104,000	-1%	104,000	-1%
TOTAL	491,000	100%	490,000	0%	485,000	-1%	489,000	0%	470,000	-4%	490,000	0%	490,000	0%

San Mateo Bridge Corridor	2025 Baseline		Alternative 1		Alternative 2		Alternative 3		Alternative 4		Alternative 5		Alternative 6	
	Persons	Percent	Persons	Change	Persons	Change	Persons	Change	Persons	Change	Persons	Change	Persons	Change
Single Occupant Vehicle	144,000	80%	142,000	-2%	143,000	-1%	146,000	1%	112,000	-22%	143,000	-1%	135,000	-7%
Carpool	35,700	20%	33,000	-8%	34,300	-4%	43,200	22%	22,200	-31%	34,800	-4%	29,500	-18%
TOTAL	180,000	100%	175,000	-3%	177,000	-2%	189,000	5%	134,000	-24%	178,000	-2%	164,000	-9%

Dumbarton Bridge Corridor	2025 Baseline		Alternative 1		Alternative 2		Alternative 3		Alternative 4		Alternative 5		Alternative 6	
	Persons	Percent	Persons	Change	Persons	Change	Persons	Change	Persons	Change	Persons	Change	Persons	Change
Single Occupant Vehicle	92,100	81%	93,500	1%	92,800	1%	92,200	0%	92,800	1%	91,700	0%	110,000	19%
Carpool	22,200	19%	19,500	-12%	23,400	6%	19,800	-10%	25,000	14%	22,100	0%	33,800	53%
TOTAL	114,000	100%	113,000	-1%	116,000	2%	112,000	-2%	118,000	3%	114,000	0%	144,000	26%

New Mid-Bay Bridge Corridor	2025 Baseline		Alternative 1		Alternative 2		Alternative 3		Alternative 4		Alternative 5		Alternative 6	
	Persons	Percent	Persons	Change	Persons	Change	Persons	Change	Persons	Change	Persons	Change	Persons	Change
Single Occupant Vehicle	-	-	-	-	-	-	-	-	77,000	79%	-	-	-	-
Carpool	-	-	-	-	-	-	-	-	20,400	21%	-	-	-	-
TOTAL	-	-	-	-	-	-	-	-	97,400	100%	-	-	-	-

Daily Vehicle Miles of Travel

A comparison of the daily Vehicle Miles of Travel (VMT) under each of the alternatives as well as the 1998 and 2025 Baselines is presented in Figure 17. These statistics are for the nine-county Bay Area in aggregate. As illustrated in Figure 17, area-wide VMT is forecast to grow by approximately 50% from 1998 to 2025, despite the Regional Transportation Plan's significant investment in transit. Given that transbay travel is only about four percent of all regional travel in 2025 and each alternative generally addresses only a portion of the transbay market, none of the six alternative packages would have notable impacts to regional VMT.

Daily Vehicle Hours of Travel

A comparison of the daily Vehicle Hours of Travel (VHT) under each of the alternatives as well as the 2025 Baseline is presented in Figure 18. As with VMT, these statistics are for the nine-county Bay Area in aggregate. For the reasons mentioned above, none of the six alternative packages would have notable impacts to aggregate regional VMT.

Miles of Congested Freeway

Figure 19 summarizes the forecast miles of congested freeway in the Bay Crossings study area under each of the six study alternatives. The freeways included in this analysis are shown in Figures 15 and 16. This analysis was conducted for the two-hour morning peak period. As presented in Figure 19, Alternatives 3, 5 and 6 would result in small increases (four to seven percent) in miles of congested freeway, with Alternative 4 resulting in a seven percent decrease.

Duration of Congestion at Toll Plazas

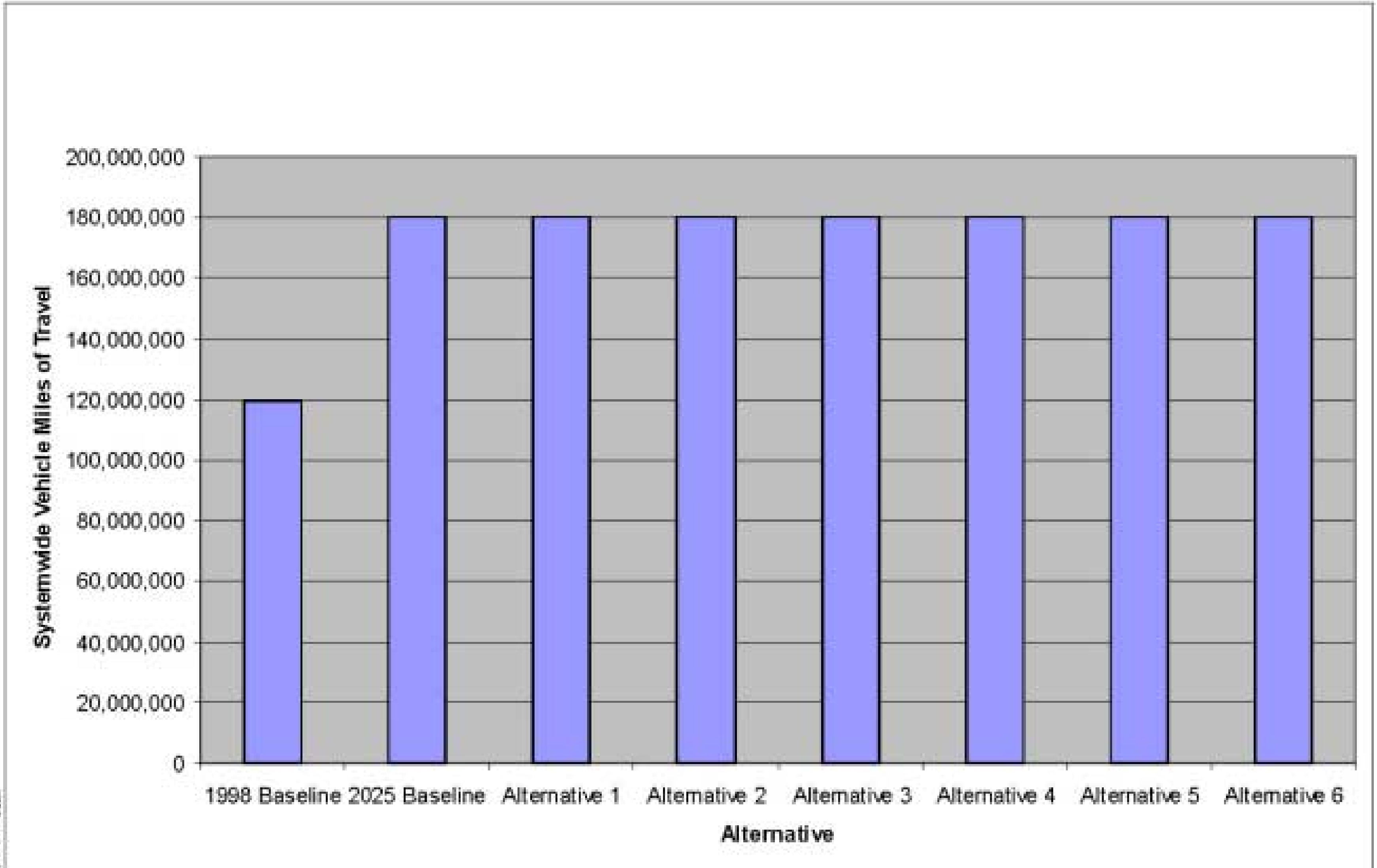
Table 6 presents the forecast duration of morning peak period congestion for each bridge and the New Mid-Bay Bridge (Alternative 4). The duration of congestion on each of the three existing bridges is projected to grow by more than one hour between 1998 and the 2025 Baseline. Of the six study alternative, only Alternative 4 would generate a notable change in the duration of toll plaza congestion. Alternative 4 would decrease the peak congested period by approximately 30 minutes for the Bay Bridge, San Mateo Bridge and Dumbarton Bridge. Morning peak period congestion would last approximately 3.5 hours on the New Mid-Bay Bridge in 2025, if constructed.

Table 6
Morning Peak Period - Duration of Congestion at Study Toll Plazas (Hours)

Toll Plaza	1998 Base	2025 Base	Alt 1 Exp Bus/ HOV	Alt 2 Bay Bridge Rail	Alt 3 SMB Widening	Alt 4 New Mid-Bay Bridge	Alt 5 Dumb Rail	Alt 6 Dumb Approach
Bay Bridge	3.97	4.76	4.73	4.72	4.70	4.19	4.75	4.76
San Mateo Bridge	2.69	4.03	4.05	3.99	3.37	3.36	4.00	4.00
Dumbarton Bridge	2.83	3.87	4.08	3.86	3.73	3.36	3.82	4.12
Mid-Bay Bridge	-	-	-	-	-	3.54	-	-

Interchange Traffic Volumes

Figures 20 to 23 present morning peak hour traffic volumes at the I-380/US 101, SR 92/I-880, SR 92/US 101 and I-238/I-880 interchanges. Volumes are presented for the 2025 Baseline, Alternative 3 and Alternative 4 scenarios. These traffic volumes were used to size the interchange improvements proposed under Alternatives 3 and 4.



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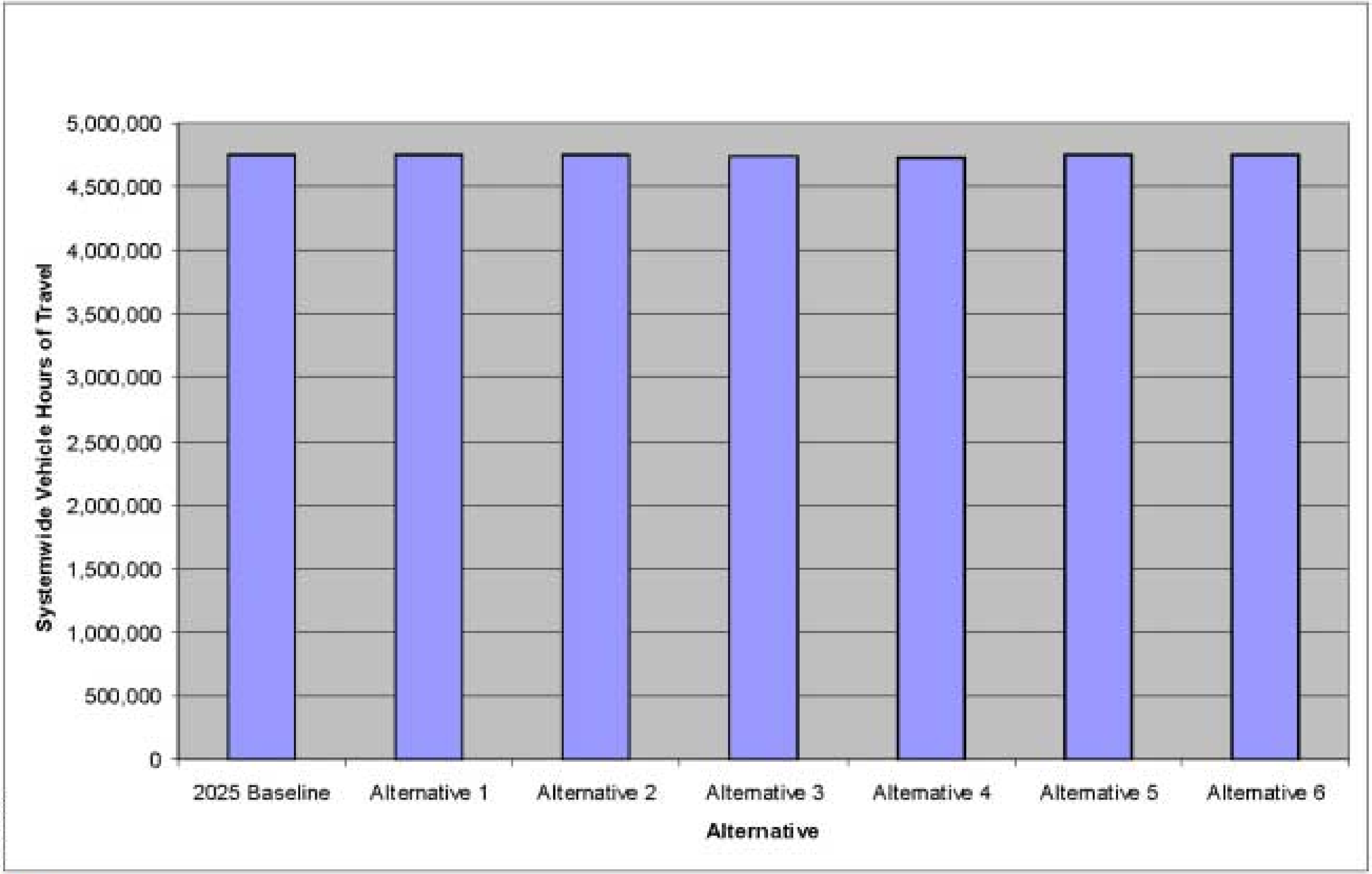
VMT COMPARISON

(Vehicle Miles of Travel)

2000 San Francisco Bay Crossings Study

Figure 17



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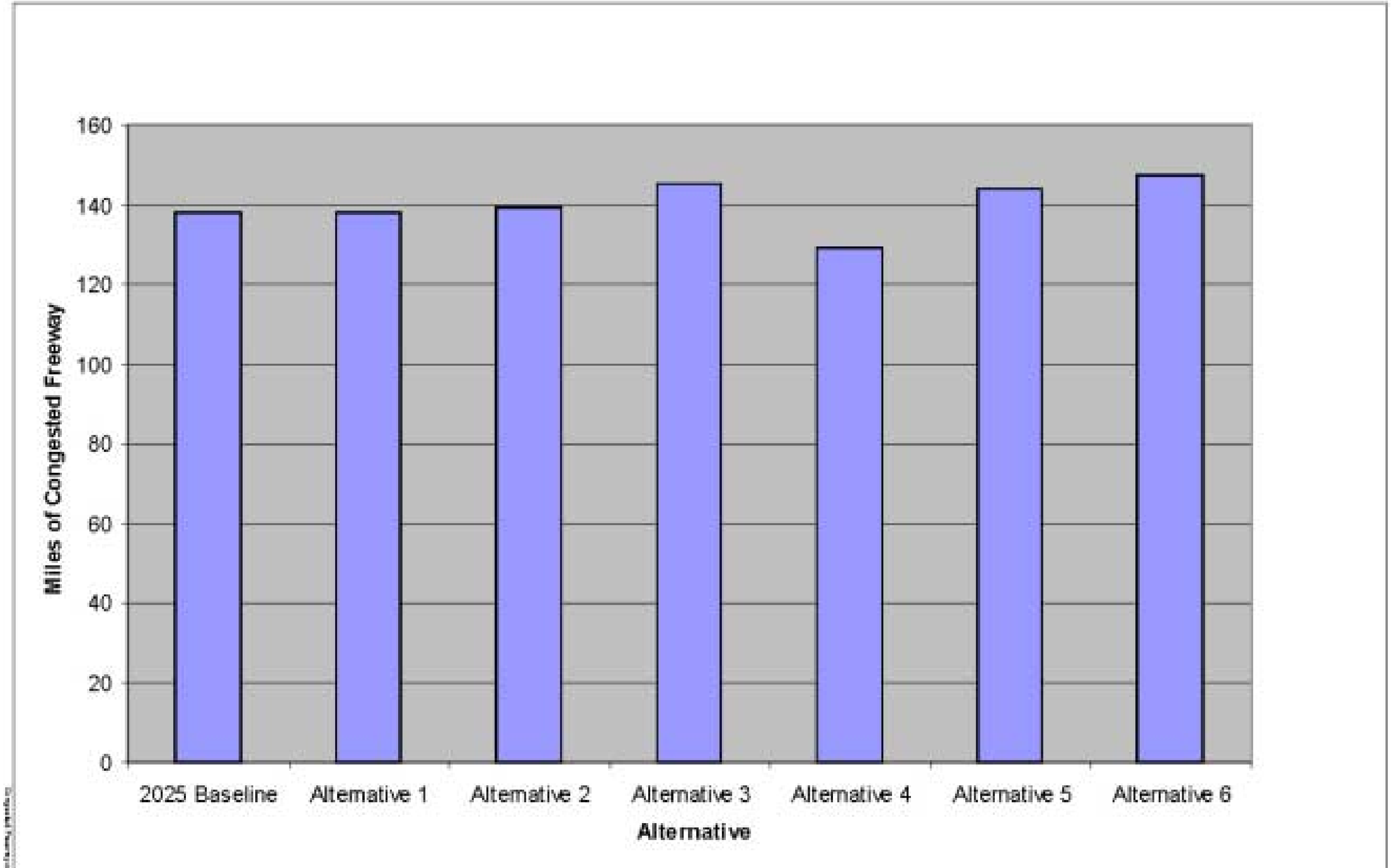
2000 San Francisco Bay Crossings Study

VHT COMPARISON

(Vehicle Hours of Travel)

Figure 18



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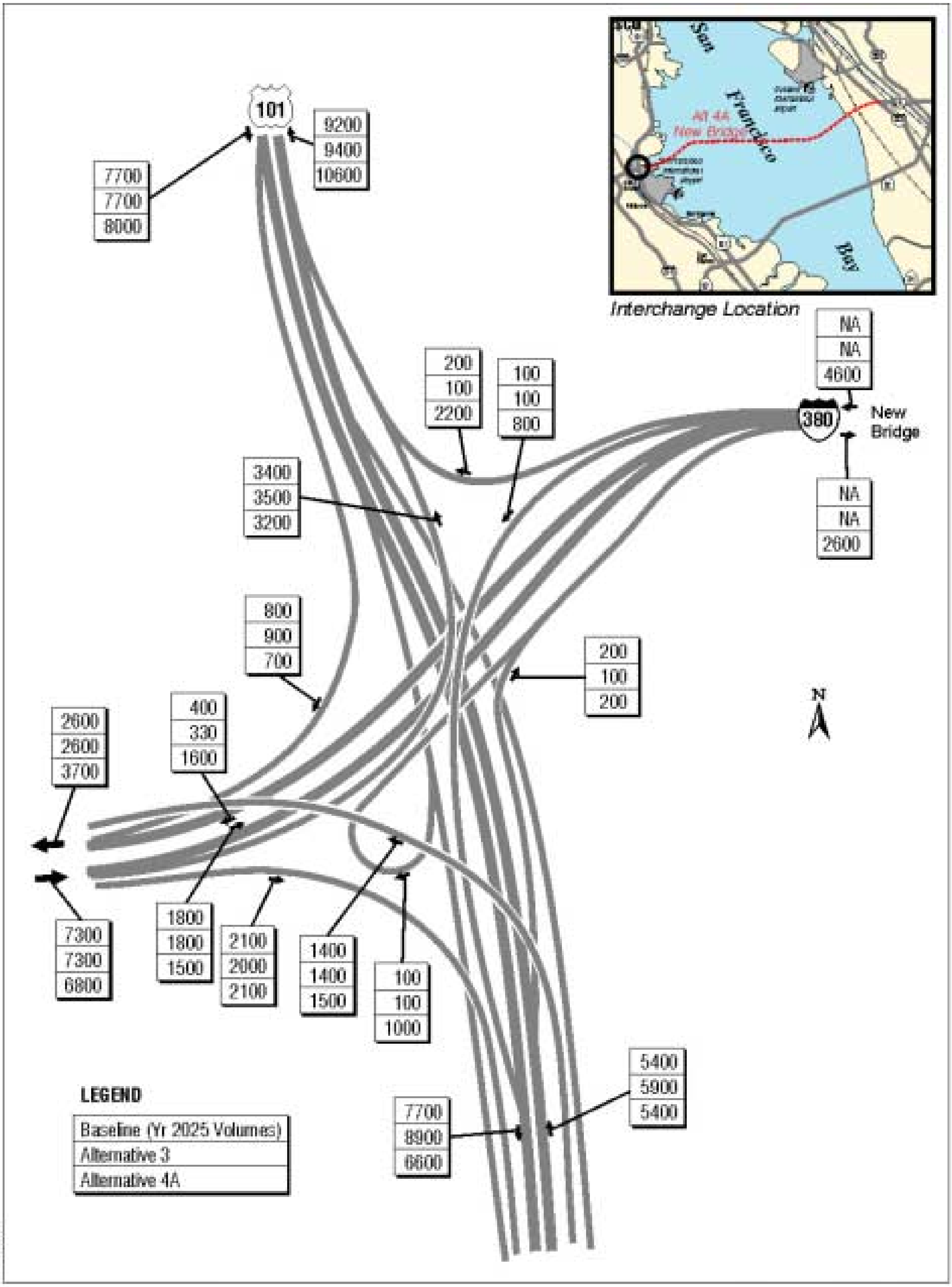
MILES OF CONGESTED FREEWAY

Two Hour AM Peak

2000 San Francisco Bay Crossings Study

Figure 19



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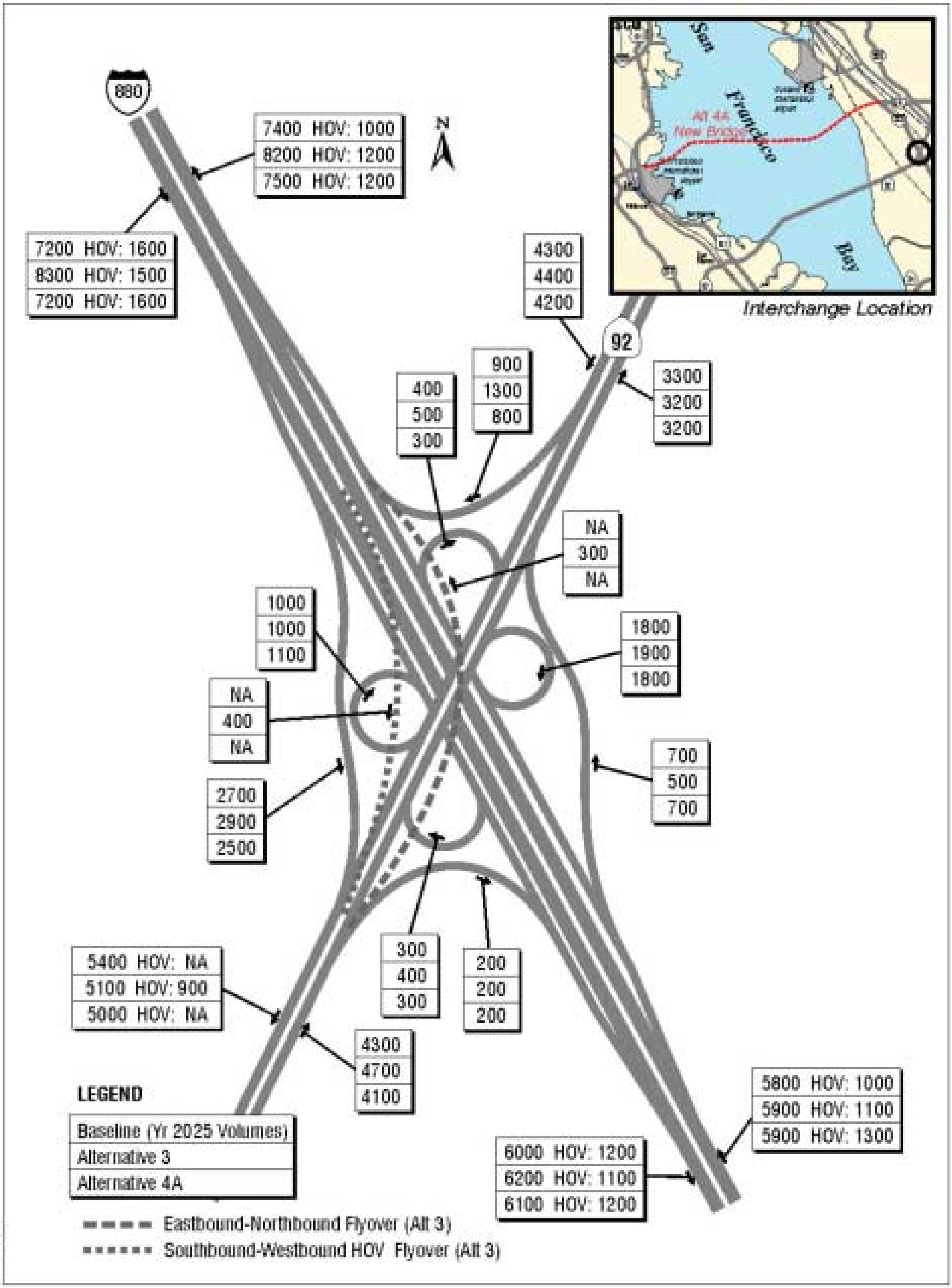
AM PEAK HOUR TRAFFIC VOLUMES

US 101 / I-380 INTERCHANGE

2000 San Francisco Bay Crossings Study

Figure 20



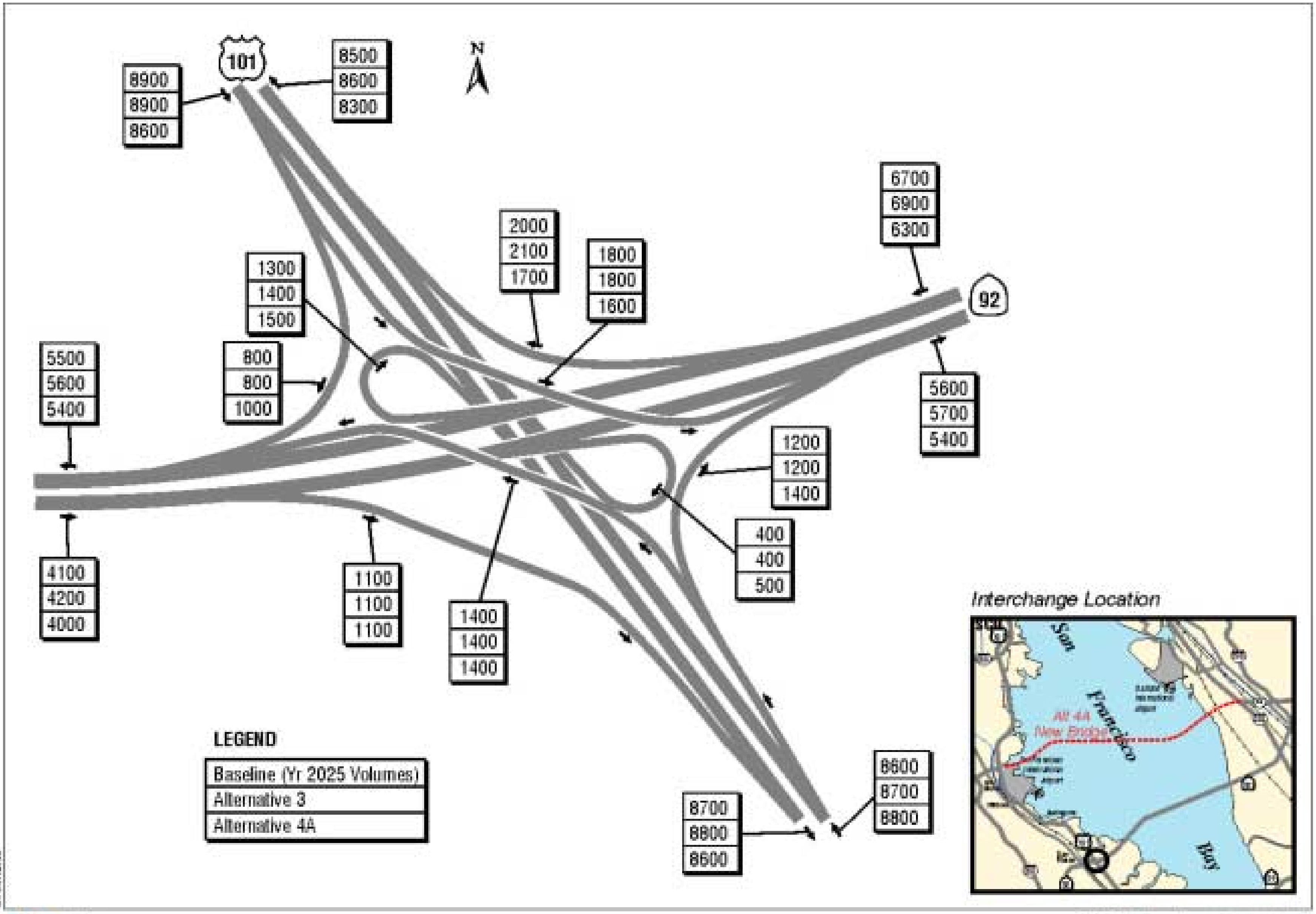
Korve Engineering

AM PEAK HOUR TRAFFIC VOLUMES

SR 92 / I-880 INTERCHANGE

2000 San Francisco Bay Crossings Study

Figure 21



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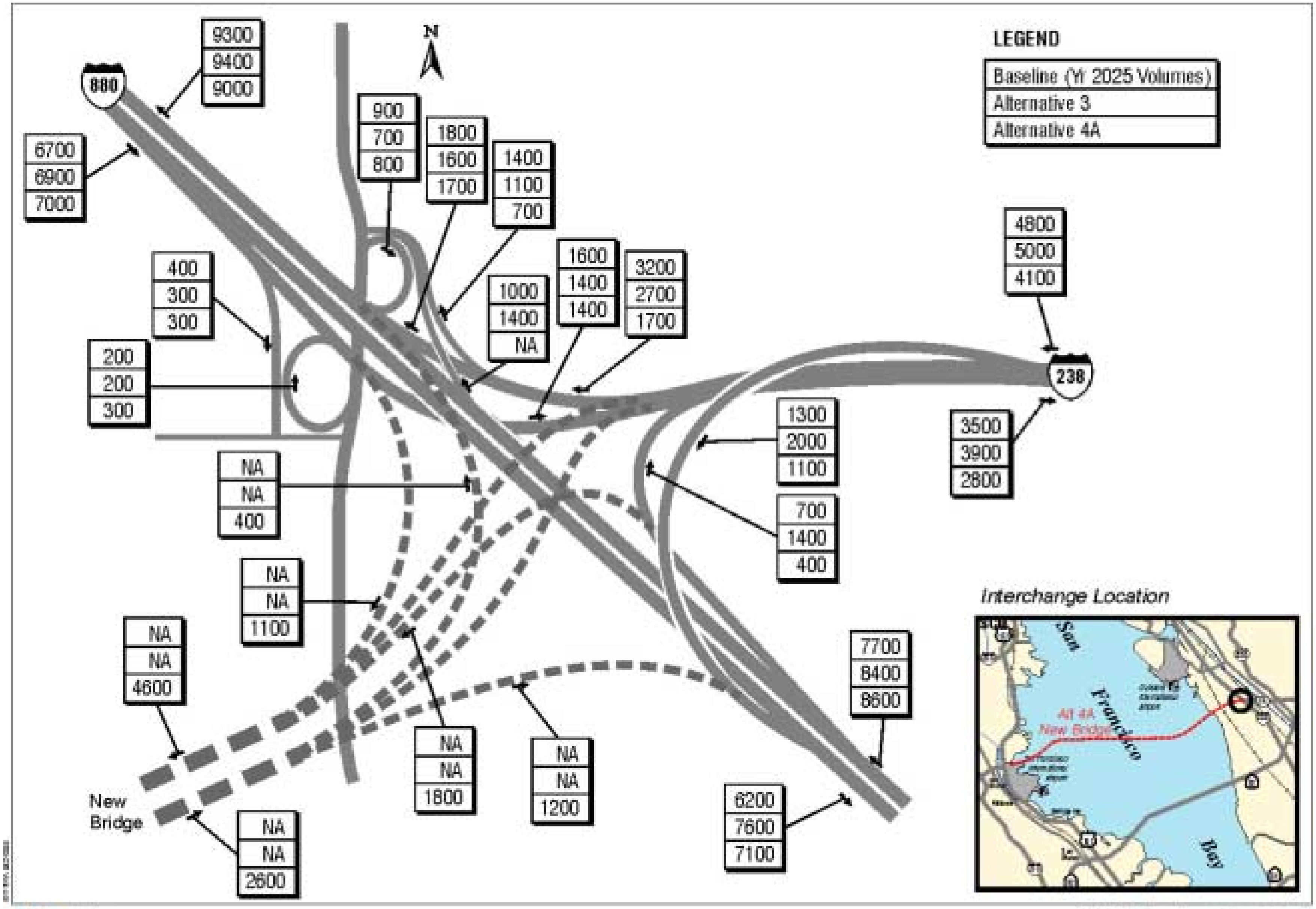
AM PEAK HOUR TRAFFIC VOLUMES

US 101 / SR 92 INTERCHANGE

2000 San Francisco Bay Crossings Study

Figure 22



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AM PEAK HOUR TRAFFIC VOLUMES

I-880 / I-238 INTERCHANGE

2000 San Francisco Bay Crossings Study

Figure 23

Transit Use by Alternative

The main objective of this section is to summarize the impact of each alternative on transbay transit travel. Table 7 summarizes transit travel in the study's corridors for the 2025 Baseline and all six alternatives. The table also includes person trips by automobile and summarizes the modal splits in each corridor. The main findings of this analysis are presented by alternative below. Figures 24, 25 and 26 summarize transit use by alternative for the Bay Bridge, San Mateo Bridge and Dumbarton Bridge, respectively.

Alternative 1 – Express Bus/HOV/Operational Improvements

The express bus improvements included in Alternative 1 would generate the following increases in transbay ridership:

- Bay Bridge – 8,000 passengers/day;
- San Mateo Bridge –6,200 passengers/day (no bus service exists in the Baseline); and
- Dumbarton Bridge – 900 passengers/day.

The BART improvements included in Alternative 1, which consisted of three additional trains per hour in the peak hour and conversion to 3-door cars on transbay lines, would result in only minor changes in BART ridership. The main benefit of this improvement would be less peak hour crowding on BART lines.

Alternative 2 – Bay Bridge Corridor Rail

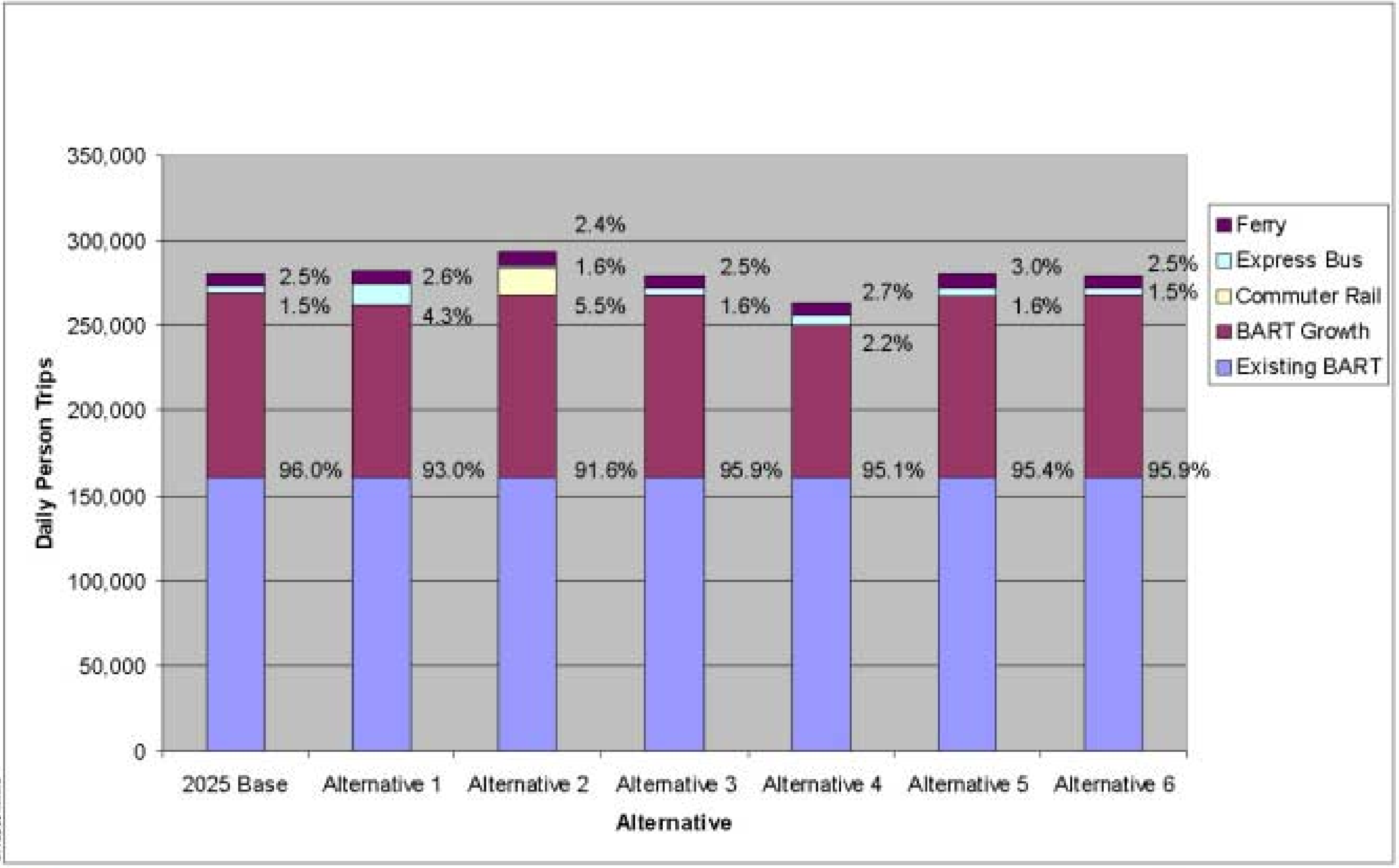
This alternative includes both a new commuter rail tunnel and a new BART tunnel connecting the East Bay with San Francisco. The new commuter rail tunnel would serve approximately 16,000 daily transbay passengers on commuter rail lines for service contained within the Bay Area. If service is extended from San Francisco to Sacramento, it would have the potential to serve an additional 4,000 transbay passengers per day. If the commuter rail service between San Francisco and Milpitas was not implemented, ridership would decrease by 3,000 to 4,000 daily transbay riders. A new BART tunnel would generate approximately 16,000 new transbay BART trips, which would represent approximately a six percent increase over the 2025 Baseline BART forecast. With the new BART tunnel, approximately 68 percent (183,000 daily trips) of BART trips would use the existing tunnel, with 32 percent using the new tunnel (86,000 daily passengers).

Alternative 4 – New Mid-Bay Bridge

Alternative 4 includes the institution of express bus service across the new facility. These express bus routes would connect the residential areas of Hayward, San Leandro and surrounding communities with the Sierra Point commercial area and the San Francisco International Airport. An extensive express bus network was tested, but the services would only attract about 1,600 daily passengers.

Alternative 5 – Dumbarton Commuter Rail

This alternative includes two levels of commuter rail service, a Basic Service Plan connecting Union City with San Jose and Millbrae and an Expanded Service Plan which includes the Union City service plus additional service from Tracy to San Jose and Millbrae and potentially San Francisco/Milpitas service. The Basic Service Plan from Union City would serve approximately 3,300 daily transbay passengers. Institution of the Expanded Service Plan would add an additional 2,600 transbay passengers, for a total ridership of approximately 5,900 daily riders. A Milpitas-San Francisco service would attract approximately 3,800 daily transbay riders.



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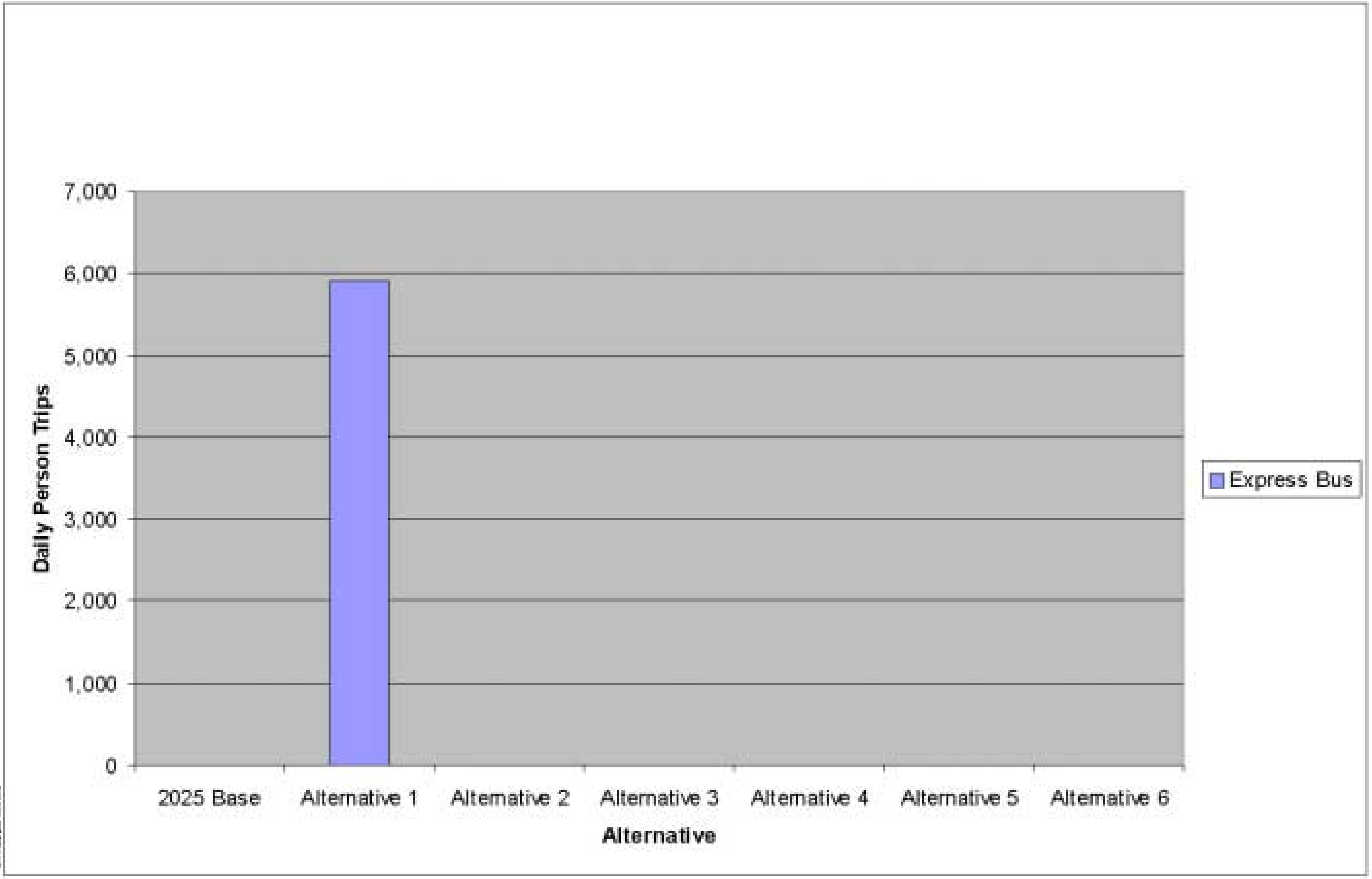
TRANSIT DAILY PERSON TRIPS COMPARISON

BAY BRIDGE CORRIDOR

2000 San Francisco Bay Crossings Study

Figure 24



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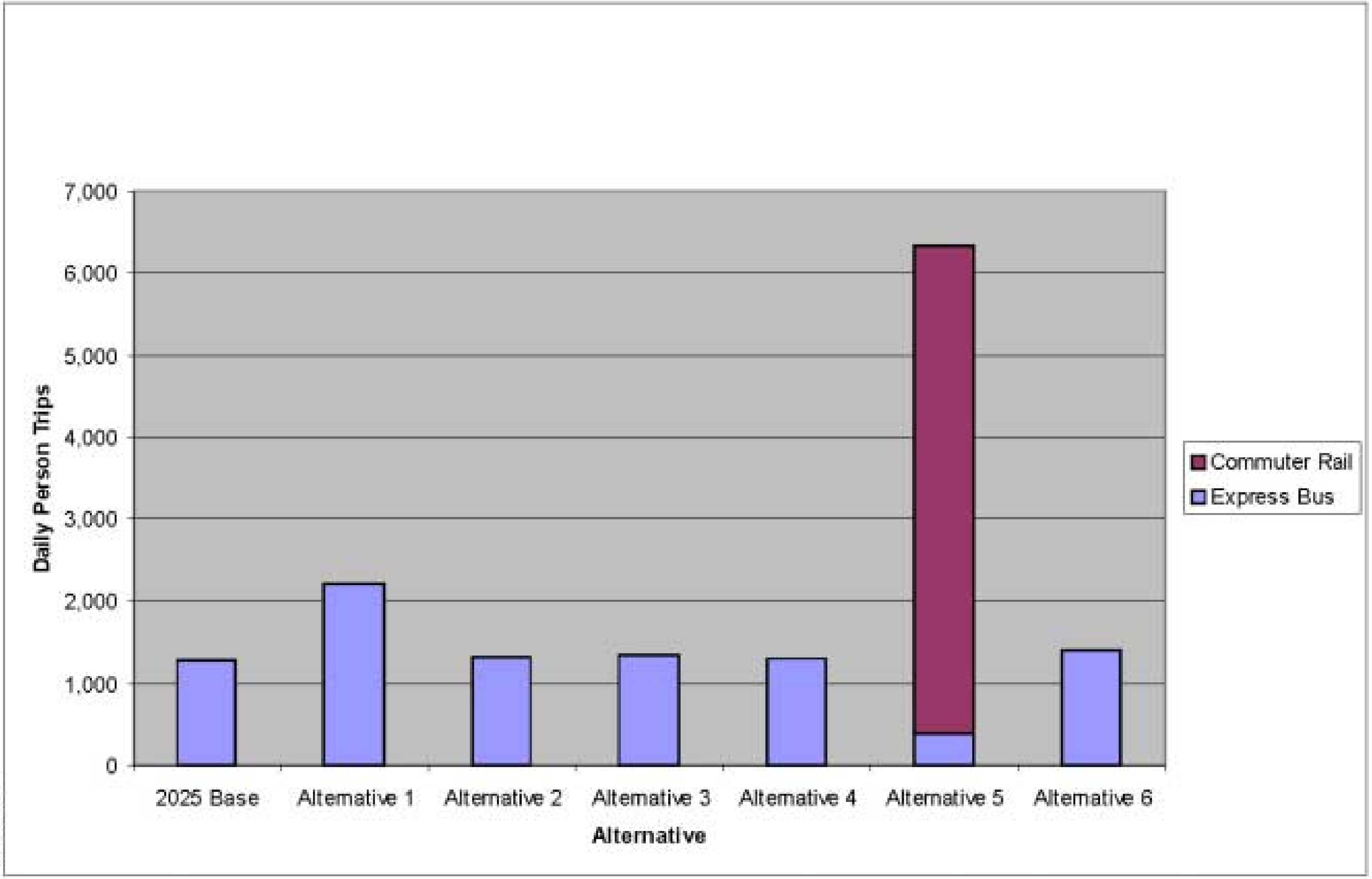
TRANSIT DAILY PERSON TRIPS COMPARISON

SAN MATEO BRIDGE CORRIDOR

2000 San Francisco Bay Crossings Study

Figure 25



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TRANSIT DAILY PERSON TRIPS COMPARISON

DUMBARTON BRIDGE CORRIDOR

2000 San Francisco Bay Crossings Study

Figure 26

Table 7
Daily Person Trips at Study Screen-lines (Automobile plus Transit)

Bay Bridge Corridor	2025 Baseline		Alternative 1		Alternative 2		Alternative 3		Alternative 4		Alternative 5		Alternative 6	
	Persons	Percent	Persons	Change	Persons	Change	Persons	Change	Persons	Change	Persons	Change	Persons	Change
Single Occupant Vehicle	386,000	50%	384,000	0%	382,000	-1%	386,000	0%	363,000	-6%	386,000	0%	386,000	0%
Carpool	105,000	14%	105,000	0%	102,000	-2%	103,000	-2%	107,000	2%	104,000	-1%	104,000	-1%
BART	254,000	33%	235,000	-7%	269,000	6%	252,000	-1%	235,000	-7%	252,000	-1%	253,000	0%
Commuter Rail	0	0%	0	0%	16,000	0%	0	0%	0	0%	0	0%	0	0%
Express Bus	19,800	3%	43,400	120%	17,000	-14%	20,000	1%	21,400	8%	20,000	1%	19,900	1%
Ferry	7,060	1%	7,090	0%	7,060	0%	7,060	0%	7,060	0%	8,410	19%	7,060	0%
TOTAL	772,000	100%	775,000	0%	793,000	3%	769,000	0%	733,000	-5%	770,000	0%	769,000	0%

San Mateo Bridge Corridor	2025 Baseline		Alternative 1		Alternative 2		Alternative 3		Alternative 4		Alternative 5		Alternative 6	
	Persons	Percent	Persons	Change	Persons	Change	Persons	Change	Persons	Change	Persons	Change	Persons	Change
Single Occupant Vehicle	144,000	80%	142,000	-2%	143,000	-1%	146,000	1%	112,000	-22%	143,000	-1%	135,000	-7%
Carpool	35,700	20%	33,000	-8%	34,300	-4%	43,200	22%	22,200	-31%	34,800	-4%	29,500	-18%
Express Bus	0	0%	6,200	0%	0	0%	0	0%	0	0%	0	0%	0	0%
TOTAL	180,000	100%	181,000	0%	177,000	-2%	189,000	5%	134,000	-24%	178,000	-2%	164,000	-9%

Dumbarton Bridge Corridor	2025 Baseline		Alternative 1		Alternative 2		Alternative 3		Alternative 4		Alternative 5		Alternative 6	
	Persons	Percent	Persons	Change	Persons	Change	Persons	Change	Persons	Change	Persons	Change	Persons	Change
Single Occupant Vehicle	92,100	80%	93,500	1%	92,800	1%	92,200	0%	92,800	1%	91,700	0%	110,000	19%
Carpool	22,200	19%	19,500	-12%	23,400	6%	19,800	-10%	25,000	14%	22,100	0%	33,800	53%
Commuter Rail	0	0%	0	0%	0	0%	0	0%	0	0%	5,940	0%	0	0%
Express Bus	1,280	1%	2,200	72%	1,320	2%	1,340	5%	1,300	1%	390	-69%	1,400	29%
TOTAL	116,000	100%	115,000	0%	118,000	2%	113,000	-2%	119,000	3%	120,000	4%	145,000	24%

New Mid-Bay Bridge Corridor	2025 Baseline		Alternative 1		Alternative 2		Alternative 3		Alternative 4		Alternative 5		Alternative 6	
	Persons	Percent	Persons	Change	Persons	Change	Persons	Change	Persons	Change	Persons	Change	Persons	Change
Single Occupant Vehicle	-	-	-	-	-	-	-	-	77,000	78%	-	-	-	-
Carpool	-	-	-	-	-	-	-	-	20,400	21%	-	-	-	-
Express Bus	-	-	-	-	-	-	-	-	1,600	2%	-	-	-	-
TOTAL	-	-	-	-	-	-	-	-	99,000	100%	-	-	-	-

Transit Capacity

The hourly transbay transit capacity (persons, both seated and standing) provided in the westbound direction in the morning peak period is presented in Table 8 below. These figures are based on the proposed service plan and policy load factors for the transit operators in question. This information is presented in graphical form in Figure 27. Few standees are anticipated for most modes, as the service plans have been sized to accommodate the forecast travel demand. Significant peak hour standees are only forecast to occur on the BART transbay service.

Table 8
Transbay Transit Person Carrying Capacity – AM Peak Hour, Westbound

Bay Bridge	**2025 Base**	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**	**Alt 5**	**Alt 6**
BART	32,400	36,000	72,000	32,400	32,400	32,400	32,400
Express Bus	5,300	10,300	5,300	5,300	5,300	5,300	5,300
Ferry	4,200	4,200	4,200	4,200	4,200	4,200	4,200
Commuter Rail	-	-	19,500	-	-	-	-
TOTAL	41,900	50,500	101,000	41,900	41,900	41,900	41,900

San Mateo Bridge	**2025 Base**	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**	**Alt 5**	**Alt 6**
Express Bus	-	650	-	-	-	-	-

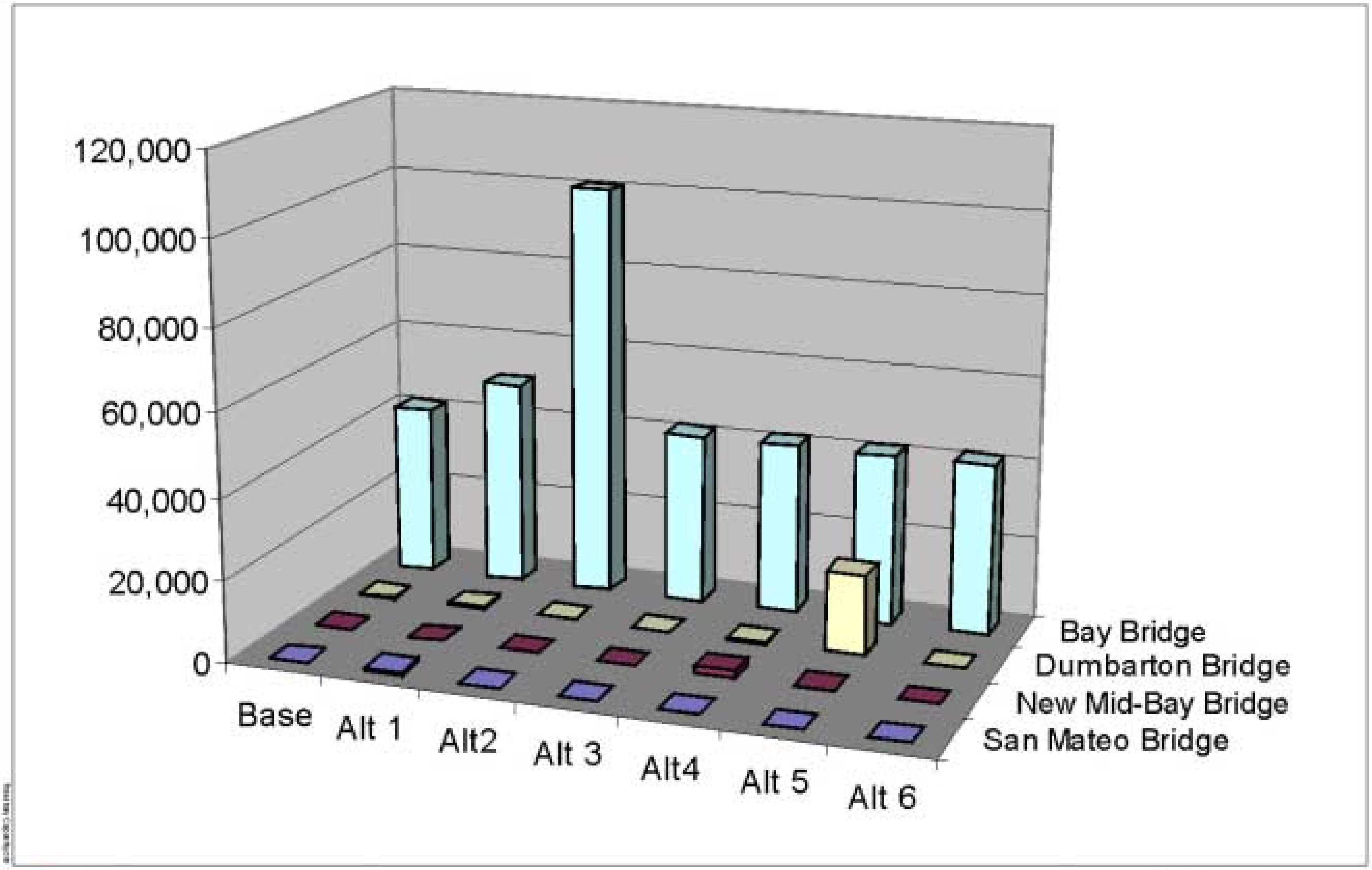
Dumbarton Bridge	**2025 Base**	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**	**Alt 5**	**Alt 6**
Express Bus	220	650	220	220	220	220	220
Commuter Rail	-	-	-	-	-	19,500	-
TOTAL	220	650	220	220	220	19,720	220

Mid Bay Bridge	**2025 Base**	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**	**Alt 5**	**Alt 6**
Express Bus	-	-	-	-	1,560	-	-

Table 9 presents westbound BART demand in the morning peak hour in the westbound direction. When BART completes its on-going refurbishment of its fleet, BART cars will have a seated capacity of 68 passengers per car. Three-door cars would have a seated capacity of 60 cars. As illustrated in Table 10, with the exception of Alternative 2, under most alternatives more than one-half of patrons on BART cars will be standing in the morning peak period in the peak direction of travel.

Table 9
BART Demand (Projected Riders) – AM Peak Hour Westbound

	2025 Baseline	**Alt 1**	**Alt 2 - Tube 1**	**Alt 2 - Tube 2**	**Alt 3**	**Alt 4**	**Alt 5**	**Alt 6**
Demand	35,100	34,100	23,900	11,100	34,900	32,500	34,900	35,000
Trains/Hour	27	30	27	27	27	27	27	27
Cars/Hour	270	300	270	270	270	270	270	270
Pax/Car	130	114	88	41	129	120	129	129



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TRANSBAY TRANSIT CAPACITY

AM PEAK HOUR, WESTBOUND

2000 San Francisco Bay Crossings Study

Figure 27

Accessibility

As a result of transbay corridor improvements, the accessibility of locations on the Peninsula and East Bay (by auto and transit) will change and in most instances improve. As studied in MTC's 2001 Regional Transportation Plan, accessibility has been measured in terms of the population that would be located within certain travel time increments of major job centers. Tables 10 and 11 present the results of this analysis.

Table 10
Number of Employed Residents within Specified Travel Times

Mode	Travel Time	**Baseline**	**Alt 1**	**Alt 2**	**Alt 3**	**Alt 4**	**Alt 5**	**Alt 6**
Downtown San Francisco								
Drive Alone	40 minutes	645,400	649,700	649,700	645,400	649,700	656,200	649,700
	50 minutes	783,400	784,600	784,600	784,600	1,019,200	784,600	789,500
	60 minutes	1,093,300	1,125,900	1,129,800	1,119,200	1,418,100	1,100,600	1,107,100
Carpool	40 minutes	622,100	625,900	622,900	622,100	965,300	622,100	631,300
	50 minutes	907,400	981,400	980,200	971,900	1,218,200	949,100	955,300
	60 minutes	1,308,900	1,329,700	1,318,900	1,317,800	1,639,600	1,308,900	1,312,300
Transit	40 minutes	800,100	833,400	850,200	812,600	800,100	796,500	793,400
	50 minutes	1,164,100	1,186,600	1,242,600	1,162,300	1,164,200	1,166,100	1,170,500
	60 minutes	1,577,500	1,599,400	1,673,700	1,578,800	1,591,700	1,570,000	1,553,400
San Francisco International Airport								
Drive Alone	40 minutes	892,200	894,500	880,900	905,800	910,500	894,500	891,900
	50 minutes	1,022,800	1,018,400	1,016,900	1,044,900	1,252,000	1,018,400	1,018,400
	60 minutes	1,154,300	1,157,800	1,150,300	1,183,900	1,708,200	1,156,700	1,154,300
Carpool	40 minutes	721,900	723,900	691,500	708,900	682,900	702,400	660,600
	50 minutes	948,900	951,600	946,400	999,100	1,183,200	951,400	932,000
	60 minutes	1,180,600	1,170,600	1,194,000	1,485,800	1,881,100	1,231,100	1,242,500
Transit	40 minutes	290,200	287,500	283,700	283,700	306,800	290,200	280,900
	50 minutes	474,300	481,000	474,300	474,300	474,300	474,300	471,000
	60 minutes	655,100	669,600	651,900	654,500	671,600	660,900	651,700
Foster City								
Drive Alone	40 minutes	870,600	893,500	886,300	898,300	1,127,500	875,900	886,300
	50 minutes	1,497,700	1,610,100	1,536,100	1,644,100	1,795,900	1,532,900	1,579,600
	60 minutes	2,142,600	2,216,000	2,179,400	2,213,600	2,398,900	2,181,800	2,191,600
Carpool	40 minutes	711,000	707,600	710,500	979,200	968,500	740,000	764,100
	50 minutes	1,849,900	1,861,900	1,840,500	2,033,300	2,059,900	1,874,300	1,867,000
	60 minutes	2,597,500	2,601,900	2,609,400	2,759,100	2,752,800	2,631,600	2,631,600
Transit	40 minutes	38,200	41,200	38,200	38,200	38,200	38,200	38,200
	50 minutes	79,700	106,200	79,700	79,700	79,700	147,900	79,700
	60 minutes	218,500	340,100	218,500	218,500	212,500	257,400	218,500
Redwood Shores								
Drive Alone	40 minutes	695,100	768,500	694,000	722,300	825,800	714,300	757,300
	50 minutes	1,384,800	1,431,200	1,393,300	1,411,500	1,467,000	1,404,900	1,403,400
	60 minutes	2,089,500	2,133,700	2,086,300	2,142,100	2,216,300	2,113,400	2,095,500
Carpool	40 minutes	1,067,800	1,030,900	1,038,300	1,090,200	1,127,200	1,098,000	1,138,600
	50 minutes	1,814,100	1,769,400	1,792,700	1,809,500	1,842,600	1,817,800	1,838,700
	60 minutes	2,187,200	2,144,200	2,147,000	2,230,100	2,308,500	2,191,400	2,214,800
Transit	40 minutes	12,600	12,600	12,600	12,600	17,900	89,100	12,600
	50 minutes	56,700	44,100	56,700	72,300	72,300	149,900	72,300
	60 minutes	137,500	113,600	132,100	134,800	134,800	319,800	141,500
Downtown Palo Alto								
Drive Alone	40 minutes	772,400	797,300	813,800	832,900	887,900	808,700	834,500
	50 minutes	1,367,300	1,449,400	1,449,800	1,444,200	1,501,500	1,432,200	1,442,300
	60 minutes	2,058,400	2,107,700	2,086,100	2,096,500	2,155,100	2,091,800	2,087,500
Carpool	40 minutes	1,109,000	1,071,400	1,131,100	1,148,200	1,211,600	1,126,300	1,155,900
	50 minutes	1,761,600	1,742,200	1,796,900	1,798,000	1,830,700	1,770,300	1,807,500
	60 minutes	2,069,600	2,071,700	2,089,500	2,096,900	2,192,700	2,083,800	2,154,600
Transit	40 minutes	309,400	309,400	309,400	309,400	309,400	437,200	309,400
	50 minutes	613,200	608,900	606,300	608,800	604,500	702,500	600,100
	60 minutes	831,300	831,300	835,400	843,900	859,600	1,000,400	859,600

Total Employed Residents	4,625,200	4,625,200	4,625,200	4,625,200	4,625,200	4,625,200	4,625,200

Table 11
Change from Baseline in Number of Workers with Access to Selected Job Centers within Specified Travel Times

Mode	Travel Time	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
Downtown San Francisco							
Drive Alone	40 minutes	4,200	4,200	0	4,200	10,800	4,200
	50 minutes	1,200	1,200	1,200	235,700	1,200	6,100
	60 minutes	32,600	36,400	25,900	324,800	7,300	13,800
Carpool	40 minutes	3,800	900	0	343,200	0	9,300
	50 minutes	74,000	72,800	64,500	310,800	41,700	47,900
	60 minutes	20,800	10,000	9,000	330,700	0	3,400
Transit	40 minutes	33,300	50,200	12,500	0	-3,600	-6,700
	50 minutes	22,500	78,600	-1,700	100	2,000	6,400
	60 minutes	22,000	96,200	1,300	14,300	-7,500	-24,100
San Francisco International Airport							
Drive Alone	40 minutes	2,300	-11,300	13,600	18,300	2,300	-300
	50 minutes	-4,400	-5,900	22,100	229,300	-4,400	-4,400
	60 minutes	3,400	-4,100	29,500	553,800	2,300	0
Carpool	40 minutes	2,000	-30,400	-13,000	-39,000	-19,500	-61,300
	50 minutes	2,700	-2,500	50,200	234,300	2,500	-16,900
	60 minutes	-10,000	13,400	305,300	700,500	50,500	62,000
Transit	40 minutes	-2,700	-6,600	-6,600	16,600	0	-9,400
	50 minutes	6,700	0	0	0	0	-3,300
	60 minutes	14,500	-3,200	-700	16,500	5,800	-3,400
Foster City							
Drive Alone	40 minutes	22,900	15,800	27,700	256,900	5,400	15,800
	50 minutes	112,400	38,400	146,400	298,200	35,200	82,000
	60 minutes	73,400	36,800	71,000	256,400	39,200	49,000
Carpool	40 minutes	-3,400	-500	268,200	257,500	29,000	53,100
	50 minutes	12,000	-9,400	183,400	210,000	24,400	17,100
	60 minutes	4,400	11,800	161,600	155,300	34,000	34,000
Transit	40 minutes	3,000	0	0	0	0	0
	50 minutes	26,500	0	0	0	68,300	0
	60 minutes	121,600	0	0	-6,000	38,900	0
Redwood Shores							
Drive Alone	40 minutes	73,400	-1,100	27,300	130,700	19,300	62,300
	50 minutes	46,400	8,600	26,700	82,200	20,100	18,700
	60 minutes	44,200	-3,200	52,600	126,800	23,900	6,000
Carpool	40 minutes	-36,900	-29,500	22,500	59,500	30,200	70,800
	50 minutes	-44,700	-21,400	-4,600	28,500	3,600	24,600
	60 minutes	-43,100	-40,200	42,900	121,300	4,200	27,600
Transit	40 minutes	0	0	0	5,300	76,500	0
	50 minutes	-12,600	0	15,600	15,600	93,200	15,600
	60 minutes	-23,900	-5,300	-2,700	-2,700	182,300	4,000
Downtown Palo Alto							
Drive Alone	40 minutes	24,800	41,400	60,500	115,500	36,300	62,100
	50 minutes	82,000	82,500	76,800	134,100	64,800	75,000
	60 minutes	49,300	27,700	38,100	96,600	33,400	29,100
Carpool	40 minutes	-37,600	22,100	39,200	102,600	17,300	46,900
	50 minutes	-19,400	35,300	36,400	69,100	8,700	45,900
	60 minutes	2,000	19,900	27,300	123,000	14,100	84,900
Transit	40 minutes	0	0	0	0	127,900	0
	50 minutes	-4,300	-6,900	-4,400	-8,800	89,300	-13,100
	60 minutes	0	4,100	12,600	28,300	169,100	28,300

Total Employed Residents	0	0	0	0	0	0

As presented in Table 11 above, the six alternative packages will increase transbay accessibility and increase the portion of Bay Area population within West Bay employment centers. Some key findings from Table 11 above:

- Alternatives 1 and 2 would increase the portion of the population within 40, 50 and 60 minutes of San Francisco by transit by 1 to 2 percent;
- Alternative 3 would increase the portion of the population within 40, 50 and 60 minutes of Foster City by drive alone and carpool by 1 to 4 percent;
- Alternative 4 would increase the portion of the population within 60 minutes of San Francisco by drive alone from 24 to 31 percent;
- Alternative 5 would increase the portion of the population within 40 to 60 minutes of Downtown Palo Alto by transit by 2 to 4 percent; and
- Alternative 6 would increase the portion of the population within 40 to 60 minutes of Downtown Palo Alto by drive alone and transit by 1 to 2 percent.

Freight

In general, improvements for auto traffic in the bridge corridors will have corollary benefits for trucks and goods movement. Table 12 presents a summary of the freight traffic characteristics on study crossing facilities for the 1998 and 2025 Baselines as well as under Alternative 4. Truck traffic, as a percentage of total traffic is expected to grow between 1998 and 2025 from 4.9 percent to 5.2 percent. Approximately two percent of traffic on the New Mid-Bay Bridge under Alternative 4 would be comprised of trucks.

Table 12
Freight Traffic Summary

Facility	1998		2025 Baseline		2025 Alternative 4	
	Truck Volume	Percent Trucks	Truck Volume	Percent Trucks	Truck Volume	Percent Trucks
Bay Bridge	13,000	4.0%	21,100	5.0%	20,500	5.1%
San Mateo Bridge	7,300	7.3%	9,700	6.1%	8,700	7.2%
Dumbarton Bridge	2,900	3.7%	3,900	3.9%	3,900	3.8%
Route 237 near Great America Pkwy	7,700	6.3%	10,700	5.6%	10,500	5.8%
Mid-Bay Bridge	---	---	---	---	2,000	2.3%
TOTAL	30,900	4.9%	45,400	5.2%	45,600	5.1%

While freight uses most of the study area facilities, the primary area analyzed is the I-238/I-580/I-880 corridor, connecting the Central Valley with container docks at the Port of Oakland. Trucks comprise approximately 14 percent of daily traffic on I-580 east of Oakland. This corridor, especially I-238 between I-580 and I-880, will be affected by Alternatives 3 and 4, which could increase vehicular delay on this link by 21 and 79 percent respectively, as shown in Figure 16. These delay increases will affect truck traffic in the same manner as automobile traffic.

Cost Effectiveness: Travel Time Saved per Dollar Spent

This measure compares the total travel time savings for travelers using all modes to the associated investment. The annual, aggregate travel time savings for each alternative is computed relative to the Baseline alternative in 2025. This number is then divided by the annualized capital cost and annual operating and maintenance cost for the alternative. Figure 28 and Table 13 show the travel time savings for each alternative.

Table 13
Summary of Annual Travel Time Savings in 2025 (millions of hours)

Alternative	Transit	Auto	Truck	Total
1 – HOV/Express Bus/Operational	3.22	2.17	0.11	5.49
2 – Bay Bridge Corridor Rail	5.55	1.05	0.08	6.68
3 – San Mateo Bridge Widening	0.63	6.45	0.08	7.16
4 – New Mid Bay Bridge	0.98	17.17	0.41	18.55
5 – Dumbarton Rail Bridge	2.33	2.06	0.10	4.48
6 – Dumbarton Approach Roadways	-0.12	4.72	0.16	4.76

Costs

To annualize the capital costs of the six alternatives, standard life cycles for buses, rail, transportation improvements and right-of-way were used, in combination with a 7 percent discount rate. These assumptions led to the use of the following annualization factors:

- Rail – 0.086;
- Buses – 0.126;
- Construction Improvements – 0.088; and
- Right-of-way – 0.07.

Table 14 presents a comparison of annual net operating costs, annualized capital cost, annual travel time savings and travel time savings per million dollars spent for each alternative. Again, the reader is referred to the Cost Report for additional details relative to the assumptions and results of the cost estimating analysis prepared for the alternatives.

Figure 29 illustrates the annual travel time savings per million dollars of invested. Alternative 5, with expanded service plan, was found to have the highest rating under this measure – roughly 114,000 hours saved annually per million dollars invested. The rating for Alternative 1 ranged from approximately 81,000, without the three high cost HOV options, to 61,000 hour saved per million dollars invested with the three high cost HOV options. Alternative 6 was found to deliver between 29,000 and 81,000 annual hours saved per million dollars invested, depending on the cost of the identified engineering solution. Alternatives 3 and 4 would bring about 25,000 to 39,000 annual hours of travel time savings per million dollars invested. Finally, Alternative 2, both the rail and BART solutions, would deliver between 4,400 and 7, 400 annual hours of travel time savings per million dollars invested.

Table 14 - Alternative Annual Cost, Travel Time Savings and Hours Saved per Million Dollars Spent

Alternative	Rail	Buses	Improvement	ROW	Net Annual O&M Cost	Annualized Cost	Total Travel Time Savings	Hours Saved per $Million Spent
Alt 1	$217,140,000	$88,077,000	$362,004,960	$16,740,864				
Annualization Factor	0.086	0.126	0.088	0.07				
	$18,674,040	$11,097,702	$31,856,436	$1,171,860	$26,600,000	$89,400,038	5,493,900	61,453
Alt 1 - w/o High 3	$217,140,000	$88,077,000	$133,764,960	$2,780,064				
Annualization Factor	0.086	0.126	0.088	0.07				
	$18,674,040	$11,097,702	$11,771,316	$194,604	$26,500,000	$68,237,662	5,493,900	80,511
Alt 2 - Low - BART	$1,464,540,000		$5,590,002,240	$53,172,000				
Annualization Factor	0.086	0.126	0.088	0.07				
	$125,950,440	$0	$491,920,197	$3,722,040	$56,600,000	$678,192,677	5,013,450	7,392
Alt 2 - High - BART	$1,464,540,000		$8,752,302,000	$53,172,000				
Annualization Factor	0.086	0.126	0.088	0.07				
	$125,950,440	$0	$770,202,576	$3,722,040	$56,600,000	$956,475,056	5,013,450	5,242
Alt 2 - Low - Rail	$223,344,000	$0	$7,242,704,640	$25,116,000				
Annualization Factor	0.086	0.126	0.088	0.07				
	$19,207,584	$0	$637,358,008	$1,758,120	$11,100,000	$669,423,712	4,560,300	6,812
Alt 2 - High - Rail	$223,344,000	$0	$11,522,400,000	$25,116,000				
Annualization Factor	0.086	0.126	0.088	0.07				
	$19,207,584	$0	$1,013,971,200	$1,758,120	$11,100,000	$1,046,036,904	4,560,300	4,360
Alt 3 - Low	$0	$0	$1,901,488,800	$150,586,800				
Annualization Factor	0.086	0.126	0.088	0.07				
	$0	$0	$167,331,014	$10,541,076	$2,600,000	$180,472,090	7,163,400	39,693
Alt 3 - High	$0	$0	$2,205,238,800	$150,586,800				
Annualization Factor	0.086	0.126	0.088	0.07				
	$0	$0	$194,061,014	$10,541,076	$2,600,000	$207,202,090	7,163,400	34,572
Alt 4 - Low	$0	$19,635,000	$6,419,132,618	$206,934,000				
Annualization Factor	0.086	0.126	0.088	0.07				
	$0	$2,474,010	$564,883,670	$14,485,380	$26,300,000	$608,143,060	18,554,400	30,510
Alt 4 - High	$0	$19,635,000	$8,017,941,600	$206,934,000				
Annualization Factor	0.086	0.126	0.088	0.07				
	$0	$2,474,010	$705,578,861	$14,485,380	$26,300,000	$748,838,251	18,554,400	24,778
Alt 5 - Basic	$43,000,000	$0	$137,000,000	$0				
Annualization Factor	0.086	0.126	0.088	0.07				
	$3,698,000	$0	$12,056,000	$0	$3,300,000	$19,054,000	n/a	n/a
Alt 5 - Expanded	$129,856,000	$0	$155,960,000	$2,620,800				
Annualization Factor	0.086	0.126	0.088	0.07				
	$11,167,616	$0	$13,724,480	$183,456	$14,200,000	$39,275,552	4,482,900	114,140
Alt 6 - Low	$0	$0	$653,711,500	$19,740,000				
Annualization Factor	0.086	0.126	0.088	0.07				
	$0	$0	$57,526,612	$1,381,800	$135,200	$59,043,612	4,757,400	80,574
Alt 6 - High		$0	$1,880,999,250	$9,727,200				
Annualization Factor	0.086	0.126	0.088	0.07				
	$0	$0	$165,527,934	$680,904	$135,200	$166,344,038	4,757,400	28,600

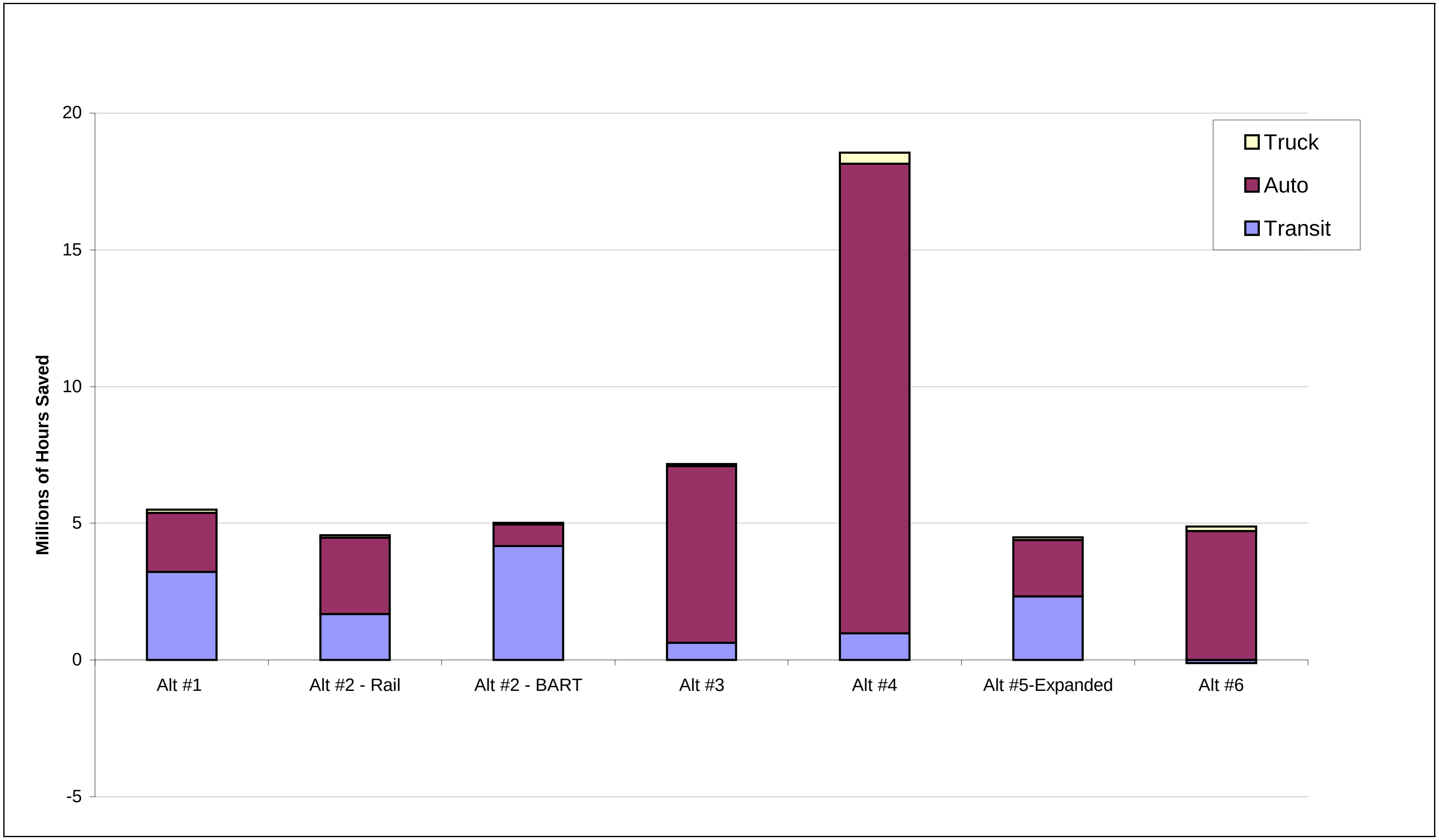

FIGURE 28
ANNUAL TRAVEL TIME SAVINGS IN 2025 BY ALTERNATIVE

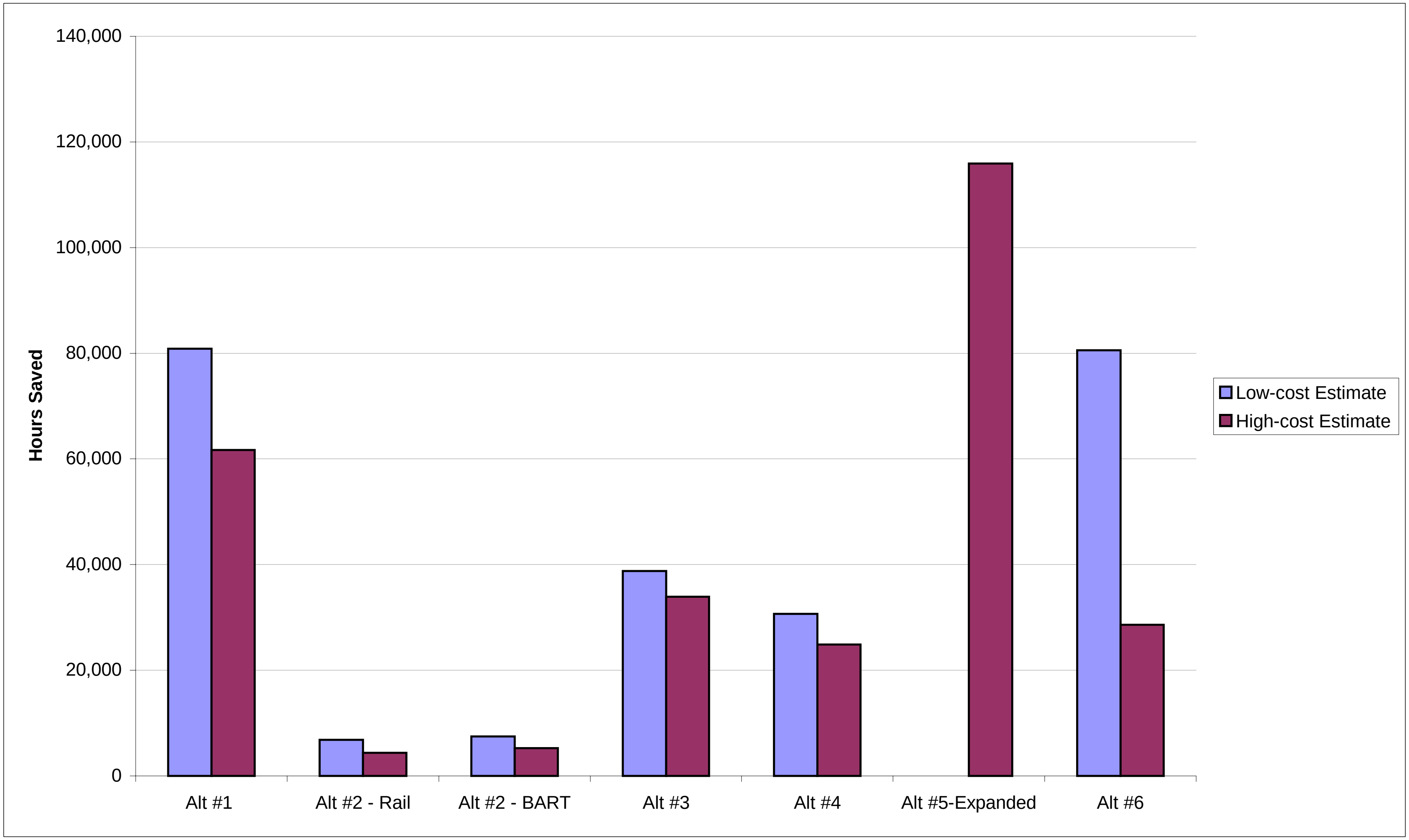

FIGURE 29
ANNUAL TRAVEL TIME SAVINGS PER MILLION DOLLARS INVESTED

Sensitivity Analyses

In addition to the six physical improvement packages, the study has also investigated a set of policy, technical and financial issues with the MTC travel demand forecasting model. This section presents the results of these "sensitivity" or "what if" tests and compares the results to the 2025 Baseline alternative, which consists of all the projects in MTC's 2001 Regional Transportation Plan. The key distinction between the transportation analysis for the sensitivity investigations and the analysis of the six main crossing alternatives is that only selected travel forecasting results are reported.

The major sensitivity runs are listed below and then discussed in greater detail in the following text:

- Congestion pricing on Bay bridges together with reduced bus/BART transfer costs;
- Higher carpool lane occupancy requirements on the bridges and on East Bay and Peninsula freeways feeding bridges;
- Impact of Blueprint projects –projects which are not yet funded in the RTP-on Bay crossing travel;
- Alternative land use –analysis of one Smart Growth land use alternative on Bay crossing travel;
- Changes in Accessibility due to a New Mid Bay Bridge; and
- Travel impact of higher tolls required to fund a new Mid-Bay Bridge.

Detailed descriptions and results of the sensitivity analyses are included in Appendix B.

APPENDIX A

TRANSIT SERVICE ASSUMPTIONS

BART Service Assumptions Summary

	Baseline	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
AM WB Headway	27	30	27 x 2	27	27	27	27
Service Detail			Tube ½				
Richmond-Colma	5	6	5/5	5	5	5	5
Millbrae-Bay Point	5	6	5/5	5	5	5	5
N Concord-Daly City	3	3	3/3	3	3	3	3
Pleasant Hill – DC	4	4	4/4	4	4	4	4
SFO – Dublin	5	6	5/5	5	5	5	5
Daly City – San Jose	5	5	5/5	5	5	5	5

Express Bus Service Assumptions Summary

	Baseline	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
Bay Bridge							
WB, AM Bus Trips	96	150	96	96	96	96	96
San Mateo Bridge							
WB, AM Bus Trips	0	10	0	0	0	0	0
New Bridge							
WB, AM Bus Trips	0	0	0	0	20	0	0
Dumbarton Bridge							
WB, AM Bus Trips	4	10	4	4	4	4	4

Commuter Rail Service Assumptions Summary

	Base	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
Bay Bridge Service							
Martinez to TBT			3 trains/hr – 20 min headways				
Fremont to TBT			3 trains/hr – 20 min headways				
Dumbarton Bridge Service							
Tracy to San Jose						40 min headways	
Union City to San Jose						40 min headways	
Tracy to Millbrae						40 min headways	
Union City to Millbrae						40 min headways	

Ferry Service Assumptions Summary

	Base	Alt 1	Alt 2	Alt 3	Alt 4	Alt 5	Alt 6
Vallejo/SF							
WB, AM Headways	15 minutes	15 minutes	15 minutes	15 minutes	15 minutes	15 minutes	15 minutes
Oakland/SF							
WB, AM Headways	15 minutes	15 minutes	15 minutes	15 minutes	15 minutes	15 minutes	15 minutes
Alameda/SF							
WB, AM Headways	15 minutes	15 minutes	15 minutes	15 minutes	15 minutes	15 minutes	15 minutes

Note: Off –peak headways = 30 minutes.

APPENDIX B

SENSITIVITY ANALYSES

INTRODUCTION

The main focus of the travel demand forecasting work to date has been to support the detailed transportation analysis of the six major Bay crossing alternatives. In addition, the study is also investigating a set of policy, technical and financial issues that require use of the MTC travel demand forecasting model. This report presents the results of these "sensitivity" or "what if" tests and generally compares the results to the 2025 Baseline alternative, which includes the transportation projects in MTC's 2001 Regional Transportation Plan (RTP).

The major sensitivity scenarios are listed below and then discussed in greater detail in the following text:

- Congestion pricing on Bay bridges together with reduced bus/BART transfer costs;
- Higher carpool lane occupancy requirements (3+) on the bridges and on East Bay and Peninsula freeways feeding bridges;
- Blueprint projects – impact of projects which are not yet funded in the RTP on Bay crossing travel;
- Alternative land use – analysis of one Smart Growth land use alternative (for 2020) on Bay crossing travel;
- Accessibility changes due to a new Mid-Bay Bridge; and
- Higher tolls – impact of a higher toll, such as required to fund a new Mid-Bay Bridge, on Bay crossing travel.

The sensitivity analysis focused on a smaller range of evaluation factors than those used for the six major crossing alternatives. These are:

- Daily and peak period vehicle volumes at bridge screenlines;
- Peak period volume-to-capacity (V/C) ratios on bridges;
- Peak period delay in bridge corridors;
- Daily transit trips at bridge screenlines; and
- Carpool usage on the bridges.

As with the evaluation of the six major study alternatives, the sensitivity analysis includes information for each bridge corridor: the Bay Bridge, new Mid-Bay Bridge – when applicable, the San Mateo Bridge, and the Dumbarton Bridge.

In addition, several other forecasting related questions are being addressed:

- For Alternative 2 BART/Conventional Rail Tunnels, the initial forecasts modeled both systems together. The new analysis is developing forecasts for each system individually (*in progress*).
- For Alternative 2 Conventional Rail, there has been an interest in lowering the cost of this alternative by truncating service that had been assumed between San Francisco and Milpitas, in other words, not building one leg of the Oakland wye. The effect of eliminating this service on prior ridership estimates has been assessed.
- For Alternative 2 Conventional Rail, there has been interest in the patronage associated with expanded service to Sacramento such as might be provided by a future High Speed Rail system. An effort has been made to forecast the additional transbay trips from rail service (not necessarily High Speed Rail) to Sacramento.

- For Alternative 2 BART, the ridership forecasts were revised to better reflect the local patronage generation potential of the four new stations that would be created with a new transbay tube.

All forecasts are for the 2025 horizon year, except the analysis of the alternative land use scenario, which is for 2020.

DESCRIPTION OF SENSITIVITY TESTS

Congestion Pricing/Reduced Transit Transfer Costs

Congestion pricing refers to establishing higher tolls during the peak commute period than for off peak travel over the bridges. The purpose of the higher peak period toll would be to encourage auto users either to drive in the off peak or use a carpool or transit option. The peak toll was assumed to be $4 on all Bay bridges and the off peak toll would stay at the current $2 (tolls on the Golden Gate Bridge were also increased by $2 for a $5 toll). It was further assumed that the revenues generated by the peak period tolls would be used to reduce the cost of transferring between bus and transbay BART lines by 50% compared to today's charge.

Higher HOV Occupancy Requirements

In this scenario, the carpool lane occupancy requirements are made uniform for all the bridges at 3+ persons or more per vehicle. That is, to use the bridges toll-free people must have three or more people in their vehicle on all the bridges. This scenario assumed that the HOV lane would continue through the toll plaza and across the bridge itself. This would require taking a lane on each bridge (for the San Mateo and Dumbarton Bridges there would be 2 mixed flow and 1 HOV lane in the peak period westbound direction; and for the Bay Bridge there would be 4 mixed flow and 1 HOV lanes for peak period, peak direction travel).

In addition, to simplify the system for motorists, HOV lanes on I-880 between Rte. 237 and the Bay Bridge in the East Bay and HOV lanes on US 101 between Rte. 237 and Rte. 92 on the Peninsula would have 3+ occupancy requirements during the peak period.

These assumptions were applied to the Operations/HOV alternative (Alternative 1).

Blueprint Analysis

As mentioned above, the baseline transportation system for the travel analysis is the set of projects in the 2001 RTP. However, there are a number of additional projects of interest to the public that are not yet funded, but if funded could have a positive impact on travel in the transbay corridor. Therefore, the main purpose for this sensitivity analysis is to gauge the potential impact of this set of projects independent of the improvements included in the six major crossing options. Key Blueprint projects for this analysis are listed below:

- Highway
  - Widen I-880 from I-238 to SR 92
  - Extend I-80 eastbound HOV lane extension from Rte. 4 to Carquinez Bridge
  - Widen of SR 92 from US 101 to I-280
  - Extend Rt. 84 Bayfront Expressway from Marsh Rd. to Woodside Rd.
  - Provide new I-880/I-680 cross connector in Fremont/Milpitas area
- Transit
  - Extend e- BART (BART on conventional rail) to Antioch
  - Extend t-BART (BART on conventional rail) to Livermore

- ACE intercity rail service enhancement from Central Valley (8 AM and 8 PM trains with reduced travel time)
- Capitol Corridor intercity rail service expansion (Phase II-16 round trips daily with reduced travel times)
- Caltrain Express improvements (Phase II -170 trains per day with reduced travel times)
- AC Transit Enhanced and Bus Rapid Transit in three corridors (Hesperian, Foothill/MacArthur, MacArthur/Airport)

Alternative Land Use Scenario

Increasing demand for transbay travel may be partially addressed by having more housing near the jobs that are being created on the Peninsula and East Bay. Five regional agencies are currently engaged in a public process to define and develop consensus on a new long-term land development pattern for the Bay Area aimed at mitigating sprawl and in commuting from counties outside the Bay Area. This Smart Growth initiative developed three distinct land use frameworks to guide the discussion with the public and elected officials. We have selected one scenario-- Alternative 1, "Central Cities"—to evaluate as part of the Bay Crossing study. The Central Cities alternative locates compact, walkable, mixed-use, and mixed-income development in the urban core (San Francisco, Oakland, and San Jose) and in each county's largest city or cities. It also locates new growth around existing transit stations. This analysis was performed for the horizon year 2020, which is the timeframe for the Smart Growth effort. Table 1 below summarizes key regional demographic and economic assumptions compared to the Bay Crossings Study Baseline (ABAG's *Projections 2002*). Table 2 shows population, housing, and employment assumptions for Alameda, Santa Clara, San Mateo, and San Francisco counties.

Table 1: Regional Demographic and Economic Assumptions in Alternative Land Use Scenario Compared to Baseline

	Regional Totals		
	2020 Baseline	**2025 Baseline**	**2020 Alternative Land Use**
Total Households	2,839,600	2,916,500	3,105,400
Total Population	8,026,900	8,224,100	8,784,200
Number of Households in Single Family Dwelling Units	1,801,300	1,854,600	1,710,800
Number of Households in Multi Family Dwelling Units	1,038,400	1,061,900	1,394,600
Mean Household Income, All Households	78,600	79,000	77,600
Net Residential Acres in Zone	572,100	575,900	479,500
Net Commercial/Industrial Acres in Zone	224,400	228,300	211,400
Total Employment	4,688,000	4,906,800	4,673,000

Table 2: Demographic and Economic Assumptions for Alameda, Santa Clara, San Mateo, and San Francisco County in the Alternative Land Use Scenario Compared to Baseline

	2020 Baseline	2020 Alternative Land Use	Change Compared to Baseline
Alameda County			
Total Households	578,800	655,100	76,300
Total Population	1,671,700	1,864,400	192,700
Total Employment	945,300	973,300	28,000
Santa Clara County			
Total Households	664,900	719,700	54,800
Total Population	2,016,700	2,211,400	194,700
Total Employment	1,308,200	1,325,500	17,300
San Mateo County			
Total Households	278,500	293,700	15,200
Total Population	809,800	850,100	40,300
Total Employment	451,800	434,600	-17,200
San Francisco County			
Total Households	331,500	425,700	94,200
Total Population	808,800	1,060,300	251,500
Total Employment	731,700	779,800	48,100

Changes in Accessibility due to a New Mid Bay Bridge

The number of trips between different Bay Area locations is a function of the spatial relationships between desired trip opportunities (such as job locations) and trip origins (home, office, etc.) as well as the efficiency of the transportation network linking these origins and destinations. In general it is expected that when accessibility between locations is improved more trips will occur because of the improved convenience of making the trip. In the case of a new Mid-Bay Bridge, accessibility would improve between various trip origins and destinations on the East Bay and the Peninsula on the West Bay. The basic analysis for all alternatives assumes a constant trip table; in other words, the number of trips between various East Bay and Peninsula zones remains the same for all alternatives. This approach is standard protocol for transportation analyses, as it facilitates a direct comparison of the benefits of possible transportation improvements, holding other factors constant.

Another approach is to "feed back" the change in accessibility created by a major transportation improvement into the trip distribution equation to see how this affects the number of trips occurring between the same origins and destinations (still holding total regional trips constant). Because a new Bay crossing has the potential to significantly alter the accessibility relationship between zones, we have tested this additional aspect in Alternative 4. The expected result would be to see greater transbay travel compared to the other alternatives. (See Table 3.)

Table 3: Accessibility Scenario – Person Trips Between/Within Counties in 2025
(Thousands of Daily Trips and Percent Change from Baseline)

	Destination									
Origin	**Alameda**	**Contra Costa**	**Marin**	**Napa**	**San Francisco**	**San Mateo**	**Santa Clara**	**Solano**	**Sonoma**	**All Counties**
Alameda	4,058	201	14	4	246	153	274	13	8	4,971
	0%	-1%	1%	0%	1%	7%	-1%	-1%	0%	0%
Contra Costa	429	2,824	15	11	196	42	47	58	9	3,630
	-1%	0%	2%	1%	0%	3%	-1%	0%	1%	0%
Marin	13	10	721	3	109	12	4	4	33	908
	-1%	0%	0%	1%	1%	0%	-1%	1%	-1%	0%
Napa	7	10	3	435	6	1	1	20	35	517
	1%	1%	3%	0%	3%	2%	0%	1%	2%	0%
San Francisco	122	37	35	2	2,167	267	52	5	7	2,694
	4%	2%	1%	2%	0%	-1%	1%	2%	3%	0%
San Mateo	99	21	11	1	424	2,061	310	2	2	2,930
	6%	4%	2%	2%	0%	0%	0%	2%	1%	0%
Santa Clara	177	18	3	1	53	236	6,696	2	2	7,187
	1%	0%	1%	1%	-2%	-1%	0%	1%	1%	0%
Solano	52	119	13	44	38	14	7	1,300	10	1,597
	-1%	0%	0%	3%	1%	0%	-2%	0%	1%	0%
Sonoma	10	7	53	29	26	5	3	6	1,652	1,791
	1%	2%	0%	0%	2%	0%	0%	3%	0%	0%
All Counties	4,967	3,248	868	529	3,264	2,791	7,392	1,410	1,758	26,227
	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Toll Financial Sensitivity Analysis

In conjunction with changes accessibility of the East Bay and Peninsula, a new Mid-Bay bridge would likely increase the cost of transbay travel for many auto users. Increased tolls would be a likely source of bridge financing, and these higher tolls would alter travel behavior by changing the relative cost and convenience of the various transbay travel modes. It is expected that use of travel on modes not subject to the higher tolls would increase, e.g., carpools and transit. As a result of these modal shifts, vehicle trips would decline, and the tolls would have to be correspondingly adjusted upward to compensate for the loss of revenues from fewer vehicles.

In this sensitivity analysis, we have assumed that increasing tolls on the Bay Bridge, San Mateo Bridge, and Dumbarton Bridge would fund cost of a new bridge. This would represent a worst-case analysis and would result in a toll of about $9, assuming a uniform toll for both the peak and off peak. A further possibility would be to spread the cost over all seven state-owned bridges in the Bay Area, which would generate a lower toll than we have modeled in this analysis.

OTHER MODELING ANALYSES

Alternative 2 Northern Line Only

For Alternative 2 Conventional Rail, the ridership forecasts were reviewed to determine how much of the originally forecasted ridership would be lost if the service from San Francisco was eliminated along with the

$3.1 to $3.8 billion tunnel connection to tracks to the south (also this would save about $8.5 million in annual operating cost). Under this scenario, the conventional rail would attract approximately 12,000 transbay trips per day, or approximately 4,000 fewer than the 16,000 estimated for both legs of the wye in operation.

Alternative 2 Conventional Rail Out of Region Forecast.

In the second sensitivity test we investigated the question of whether the High Speed Rail Authority has prepared any forecasts of travel for a service between San Francisco and Sacramento. (Their current plans call for a branch operation where the proposed HSR rail line would come into the Bay Area from the south and split into two lines in San Jose, one terminating in Oakland and the other in San Francisco.) The High Speed Rail Authority indicated it had not prepared any forecasts for a transbay service. We then considered how much regional travel MTC was projecting would originate in the Sacramento area in 2025, and in particular, how much of this travel would have a destination either in San Francisco or the northern Peninsula. Since this demand is represented in the MTC model as interregional vehicle trips, we estimated how many of these vehicle trips might be converted to rail if the commuter rail service in Alternative 2 was extended from Fairfield into the Sacramento metropolitan area (using the Capitol Corridor rail line). The MTC model forecasts 13,000 daily vehicle trips between San Francisco/northern San Mateo County and the Sacramento region in 2025. Based on this number, it is reasonable to estimate that a convenient rail service might attract about 30% of this demand, or 4,000 additional daily riders using the new commuter rail tunnel in Alternative 2. This would bring total daily transit ridership using a new commuter rail tunnel in Alt 2 to 20,000 (16,000 plus 4,000).

(Note that extension of service to Sacramento would also increase the capital and operating cost estimates for Alternative 2.)

Alternative 2 Conventional Rail Only.

In the first sensitivity analysis we simply removed the second BART tunnel and service from the model. We retained the conventional rail service definition as originally modeled in Alternative 2, which was one route from San Francisco to Fairfield and a second route from San Francisco to Milpitas. Thus, the conventional rail would be the major transit capacity enhancement in the Bay Bridge corridor (which contains over 75% of all transbay travel by transit). Under this scenario the conventional rail service, which does not compete with a new BART tunnel for new transbay transit riders, would attract 23,000 daily transbay riders compared to 16,000 in the original Alternative 2, where it has to compete with the BART tunnel. However, the modified Alternative 2 with the commuter rail tunnel only, attracts about 4,000 new transit riders in the Bay Bridge corridor, whereas the original Alternative 2 (with the new BART tunnel and more robust transbay transit service) attracted approximately 12,000 new transit riders, many of whom may have previously carpooled.

Alternative 2-BART Local Station Patronage

The study team estimates that the location of four new BART stations (three in San Francisco and one in the East Bay) would potentially add 16,000 daily BART riders over and above the existing forecasts for BART in Alternative 2. This increase is due to the local travel opportunities associated with these new stations which the MTC model has difficulty assessing because of the close proximity of these stations to existing BART stations in the MTC model's zone system, which probably underestimates the local ridership attraction potential of these stations.

RESULTS

Results for each scenario are summarized briefly below. Tables showing results for all scenarios by criterion are included at the end of this document:

- Daily and peak period vehicle volumes at bridge screenlines (Table 4 and Table 5)
- Peak period volume-to-capacity (V/C) ratios on bridges (Table 6)
- Peak period delay in bridge corridors (Table 7)
- Daily transit trips at bridge screenlines (Table 8)
- Carpool usage on the bridges (Tables 8, 9, and 10).

DISCUSSION OF SCENARIOS

Congestion Pricing/Reduced Transit Transfer Costs

Because demand elasticity in 2025 for transbay travel is very low with respect to modest toll increases, this scenario does not significantly change transbay travel patterns. There is a marginal drop in peak period traffic (fewer than 1,000 vehicles) and a marginal increase in daily transit (about 4,000 trips). The scenario has very slight impacts on delay (3% reduction) and carpool use (increase of 2,000 peak period vehicles). Note, however, that this congestion pricing approach would be expected to have a greater impact on travel if it were implemented sooner than 2025.

Traffic Volumes and V/C Ratio

The number of peak period vehicles on all bridges drops by fewer than 1,000. The number of daily vehicles on all bridges drops by less than 5,000 compared to the study Baseline. The biggest single reduction in daily traffic occurs on the San Mateo Bridge, which drops from 160,000 vehicles a day in the Baseline to 155,900 vehicles a day (3%) with congestion pricing.

Delay

This scenario results in a modest decrease in peak period vehicle hours of delay on the bridges compared to the Baseline. Total delay in all bridge corridors decreases by about 3,500 vehicle hours (3%). Most of the decrease, about 2,000 vehicle hours, occurs in the Bay Bridge corridor but in percentage terms, the decrease is equivalent in all three bridge corridors, at 3%.

Transit Ridership

The congestion pricing scenario increases daily transit ridership slightly, by 3,700 total. All of this increase occurs in the Bay Bridge corridor, which has the most established transit service.

Carpool Usage

The increase in the number of peak period carpools is approximately 2,000 total on all the bridges.

Higher HOV Occupancy Requirements

This scenario, which pivots off Alternative 1 (the HOV/Operations Alternative), has notable impacts on transbay vehicle and transit trips. There is an overall decrease in daily vehicle trips (-33,000) and increase in transit use (+28,000). The scenario decreases in vehicle hours of delay by about 10% in the peak period. Because the scenario pivots off Alternative 1, it assumes expanded bus service in all the bridge corridors; the Bay Bridge corridor has especially robust bus service, which attracts new riders.

While this scenario is instructive in so far as it demonstrates the conditions required to affect a significant increase in higher occupancy carpools, there would be real world operational constraints on applying this approach, particularly the element of taking lanes on the three bridges for HOV. In the Dumbarton and San Mateo corridors, the 3+ carpool lanes on the bridges, with V/C ratios around 0.1, are underutilized while the mixed flow lanes (with V/C ratios greater than 1.0) become extremely congested. On the Bay Bridge, the approach may create unused bridge capacity because of the dynamic nature of HOV demand and the availability of a better approach, which would constrain SOV vehicles at the metering lights to provide better service for HOVs.

Traffic Volumes and V/C Ratios

This scenario reduces total daily vehicle volumes across all three bridges by more than 33,000 vehicles a day (5%) and reduces total peak period vehicle volumes by about 11,000 vehicles (7%). The biggest impact in the peak period is in the San Mateo bridge corridor in the westbound direction, which has 24,000 peak period vehicles in the Baseline and 19,000 (including vehicles in the HOV and mixed flow lanes) in the HOV sensitivity scenario. The smallest impact is on the Dumbarton Bridge, where the number of peak period vehicles decreases by about 2,500.

Not surprisingly, AM peak period V/C ratios for mixed flow lanes in the westbound direction increase significantly in this scenario because a westbound lane on each bridge was converted to a 3+ HOV lane. On the Bay Bridge, the V/C ratio for westbound mixed flow lanes increases from 1.25 in the baseline to 1.28. Because the Bay Bridge has an established 3+ HOV market, this HOV lane is relatively well used, with a V/C of 0.72. On the San Mateo Bridge, the westbound mixed flow V/C ratio increases from 1.03 in the Baseline to 1.18. The 3+ HOV lane on the San Mateo Bridge is under-utilized, with a V/C of 0.12. The impact on the Dumbarton Bridge is even less favorable. The V/C in the westbound mixed flow lanes rises from 0.97 in the Baseline to 1.26, while the V/C ratio in the new 3+HOV lane is just 0.11.

Delay

This scenario decreases total peak period delay in the bridges corridors by 13,000 vehicle hours (10%); however, there is great variation among the three bridges. In the Bay Bridge corridor, delay drops by nearly 16,000 vehicle hours as SOVs switch to the off-peak or to transit. In the San Mateo Bridge corridor, delay decreases marginally, by about 2,000 vehicle hours, reflecting movement to the off-peak period. Delay increases by about 4,000 vehicle hours in the Dumbarton Bridge corridor, where there is limited transit service.

Transit Ridership

This alternative increases daily transit trips in all three corridors by a total of 28,000, nearly 10% over the Baseline. This increase is likely due the reduced cost of bus-BART transfers as well as the higher carpool occupancy requirement. About half the increase is in the Bay Bridge corridor where there is a net increase of 14,000 daily riders. Because this scenario pivots off Alternative 1, it includes bus service in the San Mateo Bridge corridor, which was not included in the Baseline. This scenario generates 11,200 daily bus riders in the San Mateo Bridge corridor, compared to 5,900 in Alternative 1. Transit ridership also increases in the Dumbarton Bridge corridor, where bus ridership triples to nearly 4,000 daily riders.

Carpool Use

As one would expect, this scenario increases carpool use. However, the number of carpools does not increase as much as one might assume since the primary shift is from 2-occupant carpools to 3+-occupant carpools to meet the higher occupancy requirements. The total number of AM peak period carpool vehicles in all bridge corridors increases by approximately 2,000 from the Baseline to 27,200 in this scenario. Yet, the number of 2-occupant carpools decreases by more than 5,000 while the number of 3+-occupant carpools increases by about 6,500. The result is a fair increase in the number of people carpooling, particularly in the Bay Bridge corridor. There are nearly 77,000 people in carpools in all bridge corridors in the scenario compared to 63,000 in the Baseline. In this scenario, 38% of all people making transbay trips by automobile are in carpools, compared to 31% in the Baseline.

Blueprint Analysis

The Blueprint scenario has only minor impacts on transbay vehicle and transit use, delay and carpooling. This is not surprising since the Blueprint projects are mostly outside the project study area.

Traffic Volumes and V/C Ratios

Total peak period vehicle volume on all bridges drops by less than 1,000 vehicles compared to the Baseline, and total daily vehicles volumes on all bridges drops by only 3,000 vehicles.

Delay

This scenario reduces peak period delay by about 4,000 vehicle hours compared to the Baseline. Most of the reduction occurs in the San Mateo Bridge corridor (nearly 3,000 vehicle hours) and may be due to the Blueprint project to widen I-880 between I-238 and Rte. 92, which includes freeway segments that are reflected in the delay calculation.

Transit Ridership

Transit transbay ridership drops slightly (2,000 trips daily) in this scenario. A drop in BART riders in the Bay Bridge Corridor accounts for most of the drop. The number of riders on the Dumbarton Bridge bus service also decreases from 1,300 in the Baseline to 900 in this scenario, possibly due to improvements on the Bayfront Expressway (Rte. 84).

Carpool Use

This scenario increases the number of AM peak period carpools by about 2,000.

Alternative Land Use Scenario (year 2020)

Due to the scale of the land use changes, this scenario has pronounced impacts on traffic volumes (-50,000), transit usage (+17,000), and delay (-37%). For starters, the Baseline has 958,000 daily transbay person trips, while the Land Use Scenario has 921,000 daily transbay person trips. In reviewing the results, keep in mind that the Baseline forecast is for 2025 while the Alternative Land Use forecast is for 2020. It is also important to remember that this analysis does not capture localized traffic and congestion impacts from land use changes, which would likely increase due to the additional concentration of housing and jobs in the already developed urbanized areas around the Bay.

Traffic Volumes and V/C Ratios

Total daily transbay traffic volumes decrease by about 50,000 vehicles, and peak period vehicle volumes decrease by about 24,000 vehicles. The biggest change occurs in the San Mateo Bridge corridor, where daily vehicles decrease by 32,000, about 20%. Daily vehicle volumes in the Dumbarton Bridge corridor decrease by about 8,000 (8%). Daily vehicle volumes in the Bay Bridge corridor decrease by about 10,000 (2%). These results are consistent with the city-centered growth assumption in which San Mateo County has more housing and fewer jobs in 2020 than in the Baseline in 2025. (Alameda, Santa Clara, and San Francisco counties have more jobs and more housing in the Alternative Land Use scenario in 2020 than in the Baseline in 2025.)

Consistent with the decrease in transbay vehicle trips, this scenario also results in lower V/C ratios. On the Bay Bridge, the westbound V/C ratio drops from 1.25 to 1.14. The San Mateo Bridge westbound V/C ratio drops from 1.03 to 0.90. The Dumbarton Bridge V/C ratio drops from 0.97 to 0.75.

Delay

This scenario has the most dramatic impact on delay. It reduces total peak period delay in all the bridge corridors by 46,000 vehicle hours or 37%. Delay drops by about 20,000 vehicle hours in each of the Bay Bridge and San Mateo Bridge corridors, representing a 27% decrease in the Bay Bridge corridor and a 54% decrease in the San Mateo Bridge corridor. Delay decreases by 6,000 vehicle hours (41%) in the Dumbarton Bridge corridor. These results are due in large part to the overall decreases in peak period vehicle volumes in each corridor.

Transit Ridership

Even though this scenario was forecast for 2020 rather than 2025, it shows the biggest increases in transbay transit ridership compared to the Baseline (17,000 additional trips a day). This is likely due to the fact the scenario concentrates jobs and housing in urban areas that are already relatively well served by transit. All of the increase occurs in the Bay Bridge corridor, which has the most transit options and most established service. (Because the alternative pivots off the Baseline, it does not include Dumbarton Rail service).

Carpool Use

Since this scenario was forecast for year 2020, it is useful compare the carpool share to that in the Baseline. In the Baseline, 15% of all transbay vehicles are carpools (24,900 carpool vehicles of 163,200 total vehicles) and 31% of all the people traversing the bay in automobiles are in carpools. In the Alternative Land Use scenario, 18% of all transbay vehicles are carpools (26,400 carpool vehicles of 162,400 total vehicles) and 37% of all people are in carpools. Due to the land use pattern assumed in this scenario, the Bay Bridge corridor shows the biggest increase in carpool use.

Changes in Accessibility due to a New Mid-Bay Bridge

Because this alternative tests the changes in accessibility due to the new Mid-Bay Bridge, it is most useful to compare the results to study Alternative 4, which includes the new Mid-Bay Bridge. Improved transbay access would have some impact on where trips are headed and how many trips cross the bay. The results suggest that the accessibility offered by the new bridge would affect travel patterns noticeably. The new bridge increases accessibility across the bay, particularly to destinations in northern San Mateo County. As a result, there is an overall increase in transbay trips. In addition, there is a shift among trips in existing bridge corridors, particularly from the Bay Bridge and San Mateo Bridge to the new Mid-Bay Bridge. Furthermore, as trips shift from the Bay Bridge corridor, which is transit-rich, to the new Mid-Bay Bridge corridor, in which destinations are not as conveniently served by transit, there is an associated shift from transit to automobiles. Compared to the original Alternative 4, this scenario would result in 14,000 additional daily vehicle trips and 4,000 fewer daily transit trips. The increase in vehicle trips results in a 6% increase in peak period vehicle hours of delay.

Traffic Volumes and V/C Ratios

Total daily transbay vehicles are projected to increase by 14,000 vehicles a day compared to the original Alternative 4. The number of daily peak period vehicles would increase by roughly 6,000. The increases are spread evenly across the Bay Bridge, new Mid-Bay Bridge, San Mateo Bridge and Dumbarton Bridge in terms of absolute numbers; however, these numbers represent bigger percentage increases in the New Mid-Bay Bridge (4.9%) and San Mateo Bridge (4.2%).

As expected, since peak period vehicle volumes increase relative to the original Alternative 4, V/C ratios also increase. However, because this scenario like Alternative 4 relieves traffic on the Bay Bridge and San Mateo Bridge, the V/C ratios on the existing bridges would still be lower than in the Baseline. For example, the V/C ratio on the westbound Bay Bridge is 1.25 in the Baseline, 1.10 in Alternative 4, and 1.12 in this scenario. The V/C ratio on the westbound San Mateo Bridge is 1.03 in the Baseline, 0.86 in Alternative 4, and 0.89 in this scenario.

Delay

This scenario, which increases the number of vehicle trips relative to Alternative 4, generates slightly more peak period vehicle hours of delay than Alternative 4. Total peak period vehicle hours of delay increase from about 97,000 to nearly 103,000, a difference of about 6,000 vehicle hours (6% increase). As one would expect given the assumptions, about half of the increase occurs in the Mid-Bay Bridge corridor.

Transit Ridership

This scenario shows a decrease in transbay transit ridership of about 4,000 trips a day. Transit trips in the Bay Bridge corridor decrease by 5,000, while transit trips in the New Mid-Bay Bridge corridor and the Dumbarton Bridge corridor grow slightly. This reflects a more general trend of greater accessibility to destinations served by the new bridge.

Carpool Use

Carpool use increases slightly in this scenario. There are a total of 30,100 AM peak period carpool vehicles on all bridges in this scenario, compared to 26,400 in Alternative 4 and 24,900 in the Baseline. The increase in carpools is spread more or less evenly among the four bridge corridors.

Toll Financial Sensitivity Analysis

In contrast to the congestion pricing scenario, a toll level needed to help finance the new bridge would have considerably greater impacts on transbay vehicle and transit travel. There are noticeable drops in daily transbay vehicle traffic (-14,000) and noticeable increases in daily transbay transit trips (+5,000) compared to the original Alternative 4. Delay in this scenario is estimated to be 91,000 vehicle hours in the peak period, which is less delay than in any other scenario tested – aside from the Alternative Land Use scenario, which is forecast for 2020 rather than 2025.

Traffic Volumes and V/C Ratios

This scenario suggests that a very high toll does lead to fewer transbay vehicle trips. Compared to Alternative 4, total daily transbay vehicles decrease by 14,000, with a 1% to 2% drop in each corridor except the Dumbarton Bridge corridor. Peak period travel is less sensitive, and the number of peak period vehicles decreases by about 4,000 compared to Alternative 4.

With a decrease in vehicle volumes, there is also a slight decrease in V/C ratios compared to Alternative 4. However, it is worthwhile to note that because both Alternative 4 and this scenario spread transbay traffic across four bridges, the V/C ratios still represent a big improvement over the Baseline.

Delay

The reduced vehicle volumes and V/C ratios translate to reduced delay. Peak period vehicle hours of delay drop from about 97,000 in the original Alternative 4 to about 91,000. While this is a modest improvement over Alternative 4, it is a substantial improvement over the Baseline, which has 126,000 vehicle hours of delay. Most of the reduction in delay (about 4,000 vehicle hours) occurs in the Bay Bridge corridor.

Transit Ridership

This scenario suggests a high bridge toll could increase transbay transit ridership. Forecasts show almost 5,000 additional daily transit riders. About 3,000 of the new riders are projected in the Bay Bridge corridor, particularly on buses. Bus ridership in the new bridge corridor doubles to 2,400 riders a day, and ridership on the Dumbarton Bridge express bus service increases slightly to 1,600 riders a day.

Carpool Use

This scenario has the highest number of AM peak period carpool of any scenario tested. The number of carpools in this scenario is 30,500 compared to 26,400 in Alternative 4 and 24,900 in the Baseline. The number of people in carpools in this scenario is 78,300, also higher than the other scenarios tested.

SUMMARY TABLES AND FIGURES

Table 4: Daily Vehicle Volumes on Bridges in the Study Area

Bridge	Baseline 2025	Sensitivity Tests: Congestion Pricing 2025	Sensitivity Tests: HOV Occupancy 2025	Sensitivity Tests: Blueprint Analysis 2025	Sensitivity Tests: Land Use 2020	Alt 4 2025	Sensitivity Tests: Alt 4 Accessibility Changes 2025	Sensitivity Tests: Alt 4 w/ $9 Toll 2025
Bay Bridge	425,200	423,200	409,700	426,000	414,800	401,900	404,000	391,500
New Bridge	n/a	n/a	n/a	n/a	n/a	86,100	90,300	84,300
San Mateo Bridge	159,500	155,900	140,500	158,400	127,100	121,200	126,300	119,500
Dumbarton Bridge	101,400	102,300	102,600	98,800	93,200	103,300	105,900	103,800
Total Bridges	**686,100**	**681,400**	**652,800**	**683,200**	**635,100**	**712,500**	**726,500**	**699,100**
Route 237	191,900	183,300	182,000	196,100	973,200	180,100	182,600	184,800

Table 5: AM Peak Period Vehicle Volumes on Bridges in the Study Area (4-hour peak period)

Bridge		Baseline 2025	Sensitivity Tests: Congestion Pricing 2025	Sensitivity Tests: HOV Occupancy 2025 (MF Lns/HOV Ln)	Sensitivity Tests: Blueprint Analysis 2025	Sensitivity Tests: Land Use 2020	Alt 4 2025	Sensitivity Tests: Alt 4 Accessibility Changes 2025	Sensitivity Tests: Alt 4 w/ $9 Toll 2025
Bay Bridge	Eastbound	38,300	38,000	38,000	38,100	36,200	34,200	35,100	33,700
	Westbound	47,600	47,300	38,900 / 5,500	47,300	43,400	41,900	42,600	40,700
	Total	85,900	85,300	82,500	85,400	79,500	76,100	77,800	74,400
New Bridge	Eastbound	n/a	n/a	n/a	n/a	n/a	10,600	11,400	10,200
	Westbound	n/a	n/a	n/a	n/a	n/a	21,300	21,900	20,600
	Total	n/a	n/a	n/a	n/a	n/a	31,800	33,300	30,800
San Mateo Bridge	Eastbound	18,000	17,900	17,700	17,500	13,700	14,300	15,000	13,900
	Westbound	24,200	24,200	18,400 / 900	24,000	21,100	20,100	20,900	19,800
	Total	42,200	42,100	37,100	41,500	34,700	34,400	35,900	33,600
Dumbarton Bridge	Eastbound	13,700	13,700	13,400	14,300	9,000	12,100	12,400	12,000
	Westbound	23,200	23,200	20,200 / 900	23,200	17,900	20,200	20,700	19,400
	Total	36,900	36,800	34,500	37,500	26,900	32,300	33,100	31,400
Total Bridges		**165,000**	**164,200**	**154,000**	**164,400**	**141,200**	**174,600**	**180,000**	**170,200**
Route 237	Eastbound	17,900	17,700	17,700	17,700	16,400	17,800	17,900	17,700
	Westbound	21,800	21,600	21,800	21,700	19,600	20,800	21,000	20,800
	Total	39,700	39,400	39,500	39,400	36,000	38,600	38,900	38,500

Table 6: AM Peak Period V/C Ratios on Bridges in the Study Area (4-hour peak period)

Bridge		Baseline 2025	Sensitivity Tests: Congestion Pricing 2025	Sensitivity Tests: HOV Occupancy 2025 (MF Lns/HOV Ln)	Sensitivity Tests: Blueprint Analysis 2025	Sensitivity Tests: Land Use 2020	Alt 4 2025	Sensitivity Tests: Alt 4 Accessibility Changes 2025	Sensitivity Tests: Alt 4 w/ $9 Toll 2025
Bay Bridge	Eastbound	1.01	1.00	1.00	1.00	0.95	0.90	0.92	0.89
	Westbound	1.25	1.25	1.28 / 0.72	1.25	1.14	1.10	1.12	1.07
New Bridge	Eastbound	n/a	n/a	n/a	n/a	n/a	0.66	0.71	0.64
	Westbound	n/a	n/a	n/a	n/a	n/a	0.89	0.91	0.86
San Mateo Bridge	Eastbound	0.77	0.76	0.76	0.75	0.58	0.61	0.64	0.59
	Westbound	1.03	1.03	1.18 / 0.12	1.03	0.90	0.86	0.89	0.84
Dumbarton Bridge	Eastbound	0.57	0.57	0.56	0.60	0.38	0.50	0.52	0.50
	Westbound	0.97	0.96	1.26 / 0.11	0.97	0.75	0.84	0.86	0.81

* V/C is for mixed flow lanes only

Figure 1: Peak Period V/C Ratio in the Baseline and HOV Occupancy Scenario

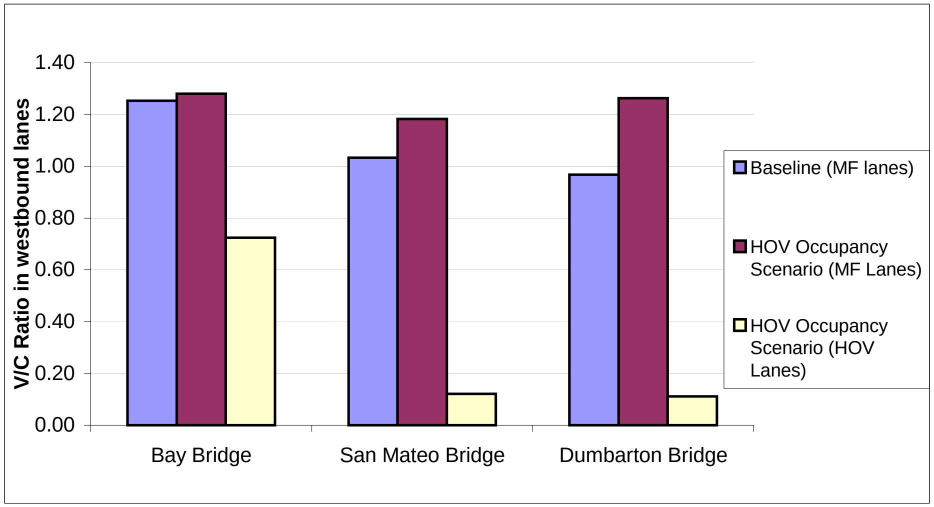

Table 7: Peak Period Vehicle Hours of Delay on Bridges in Study Area

Bridge	Baseline 2025	Sensitivity Tests: Congestion Pricing 2025	HOV Occupancy 2025 2025	Blueprint Analysis 2025	Land Use 2020	Alt 4 2025	Sensitivity Tests: Alt 4 Accessibility Changes 2025	Alt 4 w/ $9 Toll 2025
Bay Bridge	73,400	71,300	58,700	72,400	53,700	44,900	46,500	41,000
New Bridge	n/a	n/a	n/a	n/a	n/a	18,900	21,400	18,300
San Mateo Bridge	37,900	36,900	34,000	35,000	17,500	19,400	20,800	18,700
Dumbarton Bridge	15,000	14,500	20,300	14,600	8,800	13,900	14,200	13,400
Total Bridges	**126,200**	**122,700**	**113,000**	**122,000**	**80,000**	**97,200**	**102,800**	**91,400**

* Congestion on bridges and approach freeways

Figure 2: Peak Period Delay in Bridge Corridors

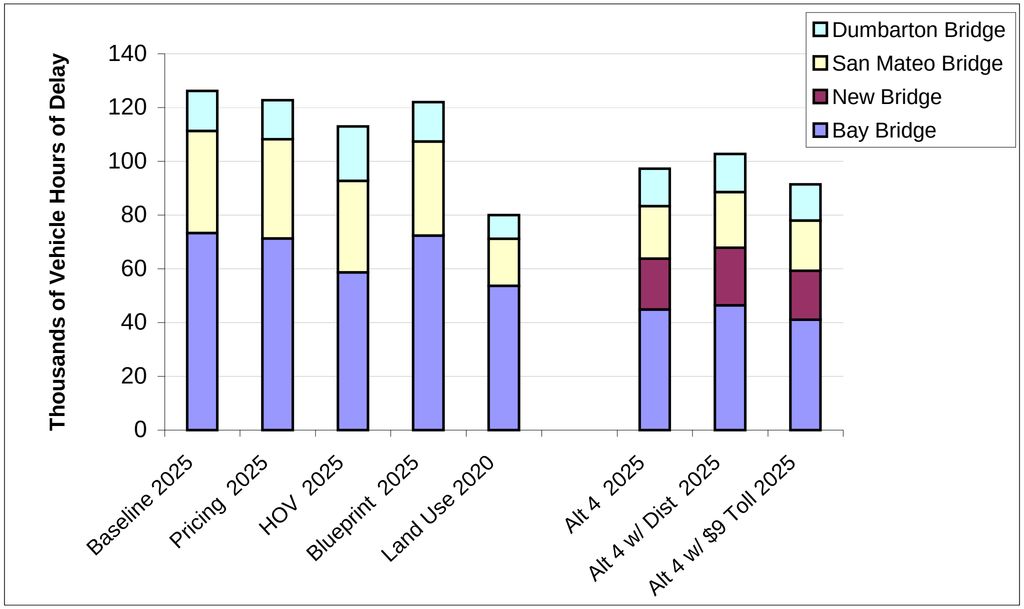

Table 8: Daily Transbay Transit Trips in Study Area

	Baseline 2025	Sensitivity Tests: Congestion Pricing 2025	Sensitivity Tests: HOV Occupancy 2025	Sensitivity Tests: Blueprint Analysis 2025	Sensitivity Tests: Land Use 2020	Alt 4 2025	Sensitivity Tests: Alt 4 Accessibility Changes 2025	Sensitivity Tests: Alt 4 w/ $9 Toll 2025
Bay Bridge								
BART	254,000	257,600	220,900	251,700	267,500	243,600	230,800	238,100
Commuter Rail	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Bus	19,800	19,900	65,600	20,600	24,700	20,800	26,500	27,400
Ferry	7,100	7,100	8,600	6,900	5,800	8,100	10,000	10,100
Bay Bridge TOTAL	280,900	284,600	295,100	279,200	298,000	272,500	267,300	275,600
New Mid-Bay Bridge								
Bus	n/a	n/a	n/a	n/a	n/a	1,200	2,100	2,400
San Mateo Bridge								
Bus	n/a	n/a	11,200	n/a	n/a	n/a	n/a	n/a
Dumbarton Bridge								
Bus	1,300	1,300	3,900	900	1,200	1,200	1,500	1,600
Dumbarton Rail	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Dumbarton TOTAL	1,300	1,300	3,900	900	1,200	1,200	1,500	1,600
All Bridges	282,200	285,900	310,200	280,100	299,200	274,900	270,900	279,600

Table 9: AM Peak Period Drive Alone and Carpool Vehicles (4-hour peak period)

Bridge		Baseline 2025	Sensitivity Tests: Congestion Pricing 2025	Sensitivity Tests: HOV Occupancy 2025	Sensitivity Tests: Blueprint Analysis 2025	Sensitivity Tests: Land Use 2020	Alt 4 2025	Sensitivity Tests: Alt 4 Accessibility Changes 2025	Sensitivity Tests: Alt 4 w/ $9 Toll 2025
Bay Bridge	SOV	71,200	70,200	63,600	70,500	63,400	61,800	62,500	58,900
	SR 2	7,500	7,700	7,200	7,700	7,900	6,600	6,800	6,700
	SR 3+	6,300	6,200	10,500	6,100	7,100	6,800	7,400	7,700
	Total HOV	13,700	13,900	17,700	13,800	15,000	13,400	14,200	14,500
New Bridge	SOV	n/a	n/a	n/a	n/a	n/a	27,600	28,500	25,900
	SR 2	n/a	n/a	n/a	n/a	n/a	3,400	3,700	3,800
	SR 3+	n/a	n/a	n/a	n/a	n/a	600	900	900
	Total HOV	n/a	n/a	n/a	n/a	n/a	3,900	4,500	4,700
San Mateo Bridge	SOV	36,700	36,500	31,600	36,000	29,900	30,500	31,300	29,100
	SR 2	3,900	3,900	2,700	3,800	3,300	2,600	3,000	3,000
	SR 3+	1,100	1,200	2,300	1,200	1,000	800	1,100	1,100
	Total HOV	4,900	5,100	5,000	5,000	4,300	3,400	4,100	4,100
Dumbarton Bridge	SOV	30,400	28,400	29,600	29,200	19,600	26,300	25,500	23,800
	SR 2	4,800	6,000	2,400	5,900	5,300	4,300	5,400	5,400
	SR 3+	1,500	2,100	2,200	2,000	1,700	1,300	1,900	1,800
	Total HOV	6,200	8,100	4,500	7,900	7,100	5,700	7,300	7,300
Total Bridges	SOV	138,300	135,100	124,800	135,700	113,000	146,300	147,900	137,700
	SR 2	16,100	17,600	12,300	17,400	16,600	16,900	19,000	18,900
	SR 3+	8,800	9,500	15,000	9,300	9,900	9,500	11,200	11,600
	Total HOV	24,900	27,100	27,200	26,700	26,400	26,400	30,100	30,500

Table 10: Persons Driving Alone and Carpooling in the AM Peak Period (4 hour peak)

Bridge		Baseline 2025	Sensitivity Tests: Congestion Pricing 2025	Sensitivity Tests: HOV Occupancy 2025	Sensitivity Tests: Blueprint Analysis 2025	Sensitivity Tests: Land Use 2020	Alt 4 2025	Sensitivity Tests: Alt 4 Accessibility Changes 2025	Sensitivity Tests: Alt 4 w/ $9 Toll 2025
Bay Bridge	SOV	71,200	70,200	63,600	70,500	63,400	61,800	62,500	58,900
	SR 2	14,900	15,500	14,400	15,300	15,700	13,100	13,700	13,500
	SR 3+	21,900	21,700	36,800	21,400	25,000	23,800	25,800	27,000
	Total HOV	36,800	37,200	51,200	36,700	40,800	36,900	39,500	40,500
New Bridge	SOV	n/a	n/a	n/a	n/a	n/a	27,600	28,500	25,900
	SR 2	n/a	n/a	n/a	n/a	n/a	6,800	7,300	7,500
	SR 3+	n/a	n/a	n/a	n/a	n/a	1,900	3,000	3,200
	Total HOV	n/a	n/a	n/a	n/a	n/a	8,700	10,400	10,700
San Mateo Bridge	SOV	36,700	36,500	31,600	36,000	29,900	30,500	31,300	29,100
	SR 2	7,800	7,700	5,400	7,600	6,700	5,200	6,000	5,900
	SR 3+	3,700	4,200	8,100	4,100	3,500	2,800	3,800	3,900
	Total HOV	11,500	11,900	13,500	11,700	10,200	8,000	9,800	9,800
Dumbarton Bridge	SOV	30,400	28,400	29,600	29,200	19,600	26,300	25,500	23,800
	SR 2	9,500	12,000	4,800	11,800	10,700	8,700	10,900	10,900
	SR 3+	5,200	7,200	7,500	7,100	6,000	4,700	6,500	6,500
	Total HOV	14,700	19,300	12,300	18,900	16,700	13,400	17,300	17,300
Total Bridges	SOV	138,300	135,100	124,800	135,700	113,000	146,300	147,900	137,700
	SR 2	32,200	35,200	24,500	34,700	33,100	33,700	37,900	37,800
	SR 3+	30,800	33,100	52,400	32,600	34,500	33,300	39,100	40,500
	Total HOV	63,000	68,300	76,900	67,300	67,600	67,000	77,000	78,300

Table 11: Carpool and Drive Alone Share of Total Persons in Automobiles in the AM Peak Period

Bridge		Baseline 2025	Sensitivity Tests Pricing 2025	HOV 2025	Blueprint 2025	Land Use 2020	Alt 4 2025	Sensitivity Tests Alt 4 w/ Dist 2025	Alt 4 w/ $9 Toll 2025
Bay Bridge	SOV	66%	65%	55%	66%	61%	63%	61%	59%
	HOV	34%	35%	45%	34%	39%	37%	39%	41%
New Bridge	SOV	n/a	n/a	n/a	n/a	n/a	76%	73%	71%
	HOV	n/a	n/a	n/a	n/a	n/a	24%	27%	29%
San Mateo Bridge	SOV	76%	75%	70%	76%	75%	79%	76%	75%
	HOV	24%	25%	30%	24%	25%	21%	24%	25%
Dumbarton Bridge	SOV	67%	60%	71%	61%	54%	66%	60%	58%
	HOV	33%	40%	29%	39%	46%	34%	40%	42%
Total - Bridges	SOV	69%	66%	62%	67%	63%	69%	66%	64%
	HOV	31%	34%	38%	33%	37%	31%	34%	36%